DOCUMENT RESUME

ED 063 041 PS 005 674

AUTHOR	Welles, Melinda Fassett
TITLE	Performance of Preschool Girls and Boys on Measures of Field-Independence-Dependence, Reflectivity-Impulsivity, and Verbal Responsiveness.
INSTITUTION	California Univ., Los Angeles. Early Childhood Research Center.
SPONS AGENCY	Office of Economic Opportunity, Washington, D.C.
PUB DATE	71
NOTE	117p.
EDRS PRICE	MF-$0.65 HC-$6.58
DESCRIPTORS	Analysis of Variance; *Comparative Testing; Conceptual Schemes; Early Childhood Education; Models; *Preschool Children; Response Mode; *Sex Differences; *Verbal Stimuli

ABSTRACT

This study was designed to investigate styles of field approach, conceptual organization, and verbal responsiveness in preschool children. These dimensions were described in terms of constructs Witkin, Kagan, and Zigler. Subjects were 23 girls and 23 boys between 50-63 months of age. Measures administered to each subject individually in the same order were the Gerard Rod and Frame, Banta Embedded Figures, Banta Matching Familiar Figures, and Harris Draw-A-Person Tests. Verbal responsiveness was assessed by Kohlberg and Zigler's adaptation of Gewirtz's verbal dependence scale. Data were organized to determine whether field-independence-dependence and reflectivity-impulsivity are identifiable in normal preschool children, and to assess whether sex differences and verbal responsiveness relate to field approach and conceptual style in this population. Results indicated that styles of field approach, conceptual organization, and verbal responsiveness were not only identifiable, but also sex differentiated among normal preschool children. Overall, boys were more field-independent, and girls more verbally responsive. All measures, save Banta's Embedded Figures Test and the Articulation of Body Concept analysis of Harris' Draw-A-Person test, were found appropriate for normal pre-school children. (Author)

ED 063041

F-OEO
PS

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

Performance of Preschool Girls and Boys on Measures of Field-Independence-Dependence, Reflectivity-Impulsivity, and Verbal Responsiveness

Melinda Fassett Welles

University of California, Los Angeles

PS 005674

This study was a master's thesis under the supervision of Dr. Barbara Keogh. It was carried out through the UCLA Center for Research in Early Childhood Education, sponsored by the United States Office of Economic Opportunity, Contract No. CG 9938, Dr. Carolyn Stern, Director.

1971

UNIVERSITY OF CALIFORNIA

Los Angeles

Performance of Preschool Girls and Boys on Measures of Field-Independence-Dependence, Reflectivity-Impulsivity, and Verbal Responsiveness

A thesis submitted in partial satisfaction of the requirements for the degree Master of Arts in Education

by

Melinda Fassett Welles

Thesis Committee:

Professor Barbara K. Keogh, Chairman

Professor John R. Kershner

Professor Charles Y. Nakamura

1971

TABLE OF CONTENTS

page

LIST OF TABLES v

ACKNOWLEDGEMENTS viii

ABSTRACT ix

CHAPTER

I. SURVEY OF THE LITERATURE 1

II. METHODS 29

III. RESULTS 41

IV. DISCUSSION 86

BIBLIOGRAPHY 99

APPENDICES 103

LIST OF TABLES

TABLE page

1. GRFT Means and Standard Deviations across Blocks for Total Group, Girls, and Boys 42

2. Analysis of Variance for Girls and Boys GRFT Scores on Block 2 and Block 3 42

3. GRFT Means and Standard Deviations within Blocks for Total Group, Girls, and Boys 43

4. Analyses of Variance for Girls and Boys GRFT Scores on Trials of Blocks 2 & 3 44

5. Product-Moment Coefficients of Correlation Between Trials and Total for Block 2 and Block 3 of GRFT for Total Group 45

6. Product-Moment Coefficients of Correlation between Trials and Total for Block 2 and Block 3 of GRFT for Girls and Boys 46

7. EFT Means and Standard Deviations for Total Group, Girls, and Boys with Comparisons between Girls and Boys 48

8. Analyses of Variance for Girls' and Boys' Unweighted and Weighted Verbal Responses on the EFT 48

9. EFT Means and Standard Deviations of Unweighted and Weighted Verbal Responses for Total Group, Girls, and Boys 49

10. Product-Moment Coefficients of Correlation Between EFT Variables for Total Group 51

11. Product-Moment Coefficients of Correlation Between EFT Variables for Girls and Boys 52

12. MFF Means and Standard Deviations for Total Group, Girls, and Boys 54

13. MFF Means and Standard Deviations of Social-Independence-Dependence Scores for Total Group, Girls, and Boys 55

14. Analysis of Variance for Girls' and Boys' MFF Social-Independence and Social-Dependence Scores 55

TABLE page

15. MFF Means and Standard Deviations of Unweighted and Weighted Verbal Responses for Total Group, Girls,and Boys 56

16. Analyses of Variance for Girls' and Boys' Unweighted and Weighted Verbal Responses on the MFF 57

17. Product-Moment Coefficients of Correlation between MFF Variables for Total Group 58

18. Product-Moment Coefficients of Correlation between MFF Variables for Girls and Boys 59

19. DAP Means and Standard Deviations for Total Group, Girls, and Boys with Comparisons between Girls and Boys 61

20. DAP Means and Standard Deviations of Unweighted and Weighted Verbal Responses for Total Group, Girls, and Boys 62

21. Analyses of Variance for Girls' and Boys' Unweighted and Weighted Verbal Responses on the DAP 63

22. Product-Moment Coefficients of Correlation between DAP Variables for Total Group 64

23. Product-Moment Coefficients of Correlation between DAP Variables for Girls and Boys 65

24. Product-Moment Coefficients of Correlation between Variables of the GRFT, EFT, MFF, and DAP for Total Group 68

25. Product-Moment Coefficients of Correlation between Variables of the GRFT, EFT, MFF, and DAP for Girls and Boys 69

26. Product-Moment Coefficients of Correlation for Total Scores on the GRFT, EFT, and DAP for Total Group 70

27. Product-Moment Coefficients of Correlation for Total Scores on the GRFT, EFT, and DAP for Girls and Boys 70

28. Number of Field-Independent and Field-Dependent Subjects on the GRFT, EFT, and DAP by Sex 71

29. Number of Reflective and Impulsive Subjects on the MFF by Sex 73

TABLE page

30. VR Means and Standard Deviations on the EFT, MFT, and DAP for Total Group, Girls, and Boys 74

31. Analyses of Variance for Girls' and Boys' Total Unweighted and Weighted Verbal Responses across the EFT, MFF, and DAP 75

32. Product-Moment Coefficients of Correlation between Unweighted Verbal Responses on the EFT, MFF, and DAP for Total Group 76

33. Product-Moment Coefficients of Correlation between Unweighted Verbal Responses on the EFT, MFF, and DAP for Girls and Boys 77

34. Product-Moment Coefficients of Correlation between Weighted Verbal Responses on the EFT, MFF, and DAP for Total Group 78

35. Product-Moment Coefficients of Correlation between Weighted Verbal Responses on the EFT, MFF, and DAP for Girls and Boys 79

36. Number of Verbal-Independent and Verbal-Dependent Subjects across the EFT, MFF, and DAP by Sex 80

37. Product-Moment Coefficients of Correlation between CA and GRFT, EFT, MFF, and DAP Scores for Total Group, Girls, and Boys 82

38. Product-Moment Coefficients of Correlation between Intellectual Maturity and GRFT, EFT, MFF, and DAP Scores for Total Group, Girls, and Boys 83

ABSTRACT

This study was designed to investigate styles of field approach, conceptual organization, and verbal responsiveness in preschool children. These dimensions were described in terms of constructs developed by Witkin, Kagan, and Zigler.

Subjects were 23 girls and 23 boys between 50-63 months of age. Measures administered to each subject individually in the same order were the Gerard Rod and Frame, Banta Embedded Figures, Banta Matching Familiar Figures, and Harris Draw-A-Person Tests. Verbal responsiveness was assessed by Kohlberg and Zigler's adaptation of Gewirtz's verbal dependence scale.

Data were organized to determine whether field-independence-dependence and reflectivity-impulsivity are identifiable in normal preschool children, and to assess whether sex differences and verbal responsiveness relate to field approach and conceptual style in this population.

Results indicated that styles of field approach, conceptual organization, and verbal responsiveness were not only identifiable, but also sex differentiated among normal preschool children. Overall, boys were more field-independent, and girls more verbally responsive. Field-independence-dependence, reflectivity-impulsivity, and verbal responsiveness were not related to age or intellectual maturity. Few significant relationships between the Gerard Rod and Frame, Banta Embedded Figures, Banta Matching Familiar Figures, and Harris Draw-A-Person Tests performance were found. All measures, save Banta's Embedded Figures Test and the Articulation-of-Body-Concept analysis of Harris' Draw-A-Person Test, were found appropriate for normal preschool children.

CHAPTER I

SURVEY OF THE LITERATURE

Introduction

Theory and tests of individual differences in field articulation proposed by H. A. Witkin and his associates have been interpreted as reflecting a pervasive, encompassing mode of perceptual-conceptual functioning known as "global-analytic articulation". Relationships between this dimension and personality and intelligence variables, sex, and developmental levels have been established. Measures of field-independence-dependence, Witkin's terms for field organization, include the Room and Body Adjustment Tests, the Rod and Frame Test, the Embedded Figures Test, and the Articulation-of-Body-Concept analysis of the Draw-A-Person Test.

Individual differences in perceptual discrimination and response time as they relate to cognitive styles have been analyzed by Kagan and his colleagues. On tests of Conceptual Style, Design Recall, Visual Analysis, and Matching Familiar Figures, delayed response time and low error rate have been termed "reflectivity"; short response latency and high error frequency have been designated "impulsivity". Thus, the reflectivity-impulsivity construct is bidimensional. Reflective and impulsive styles have been found to correlate with analytic and relational modes of cognitive style as well as to be associated with characteristics of sex, age, intelligence, and personality.

Recent research may be interpreted to suggest Kagan's dichtomy of cognitive style is related to Witkin's construct of field articulation in that both stress a perceptual variable related to the manner in which

a complex stimulus array is perceived and analyzed. Also concordant between these constructs are implications of intellective factors, behavioral characteristics, sex differences, developmental levels, and relative individual stability across tasks and time.

Researchers identifying styles of field articulation and spatial organization among children have observed sex differences in mode and amount of verbal responsiveness and task orientation which appear related to field organization. Theoretical and empirical support for their observations is lent by Zigler's prolific research with mental retardates and normals, in which social dependency is defined as a motivating force for task perserverance. Garai and Scheinfeld's extensive review of the literature on sex differences in mental and behavioral traits provides further evidence of sex related characteristics in verbal responsiveness and perceptual organization.

The foregoing research may be interpreted to suggest a perceptual and conceptual variable common to field-independence-dependence and reflectivity-impulsivity, related to sex and verbal responsiveness, and possibly identifiable during early childhood. Inasmuch as longitudinal developmental studies have demonstrated substantial correlations between cognitive performance as early as age five to adulthood, further research on the origins of styles of field approach and conceptual organization in young children is needed.

Field organization and conceptual style constructs have been studied extensively among adults and school age children. Preliminary research has been done to modify adult instruments and test materials, rendering them appropriate for young children and feasible for use in

school settings. Adaptations of Witkin's and Kagan's measures for children have resulted in at least two portable Rod and Frame Tests, several Embedded Figures Tests, and a Matching Familiar Figures Test. Kohlberg and Zigler have utilized a social dependency scale devised by Gewirtz to assess type and amount of verbal responsiveness in children. To date, no relationship has been established between Gerard's and Banta's adaptations of Witkin instruments or among the various measures.

The present study was designed to determine whether styles of field-independence-dependence and reflectivity-impulsivity are identifiable in normal preschool children, and to assess whether sex differences and verbal responsiveness relate to field approach and conceptual style in this population. Gerard's Rod and Frame Test, Banta's Embedded Figures Test and Matching Familiar Figures Test, and the Harris Draw-A-Person Test were administered to forty-six, four and five year old girls and boys. Data were analyzed to investigate possible sex differences in performance, to assess consistency of performance, and to consider relationships among measures.

History of Witkin Research

In early studies concentrating upon perception of the upright, Witkin and his associates observed marked individual differences among adults' orientation in space (Asch & Witkin, 1948a, 1948b; Witkin & Asch, 1948a, 1948b). Some individuals perceived the upright by relying upon horizontals and verticals of the predominant visual field, while others utilized kinesthetic sensations or gravitational pull as cues to verticality. In most experimental settings, the former group aligned themselves with the visual field; the latter aligned themselves

at or close to the true vertical. Moreover, women were found more dependent upon the visual field than were men.

In a study designed to identify the variables responsible for these consistent individual differences, Witkin and his colleagues (Witkin, Lewis, Hertzman, Machover, Meissner, & Wapner, 1954) examined the extent to which individual differences in perception were self-consistent, related to personality, and changed with developmental level. Individual differences in perception were assessed by correlating subjects' performance on perceptual and personality test batteries. Major perceptual measures included the Rod and Frame Test (RFT), the Embedded Figures Test (EFT), and the Room and Body Adjustment Tests (RAT, BAT). The latter tests combined two components of the perceptual measure originally termed the Tilting-Room-Tilting-Chair Test (TR-TC). In a series of manipulations controlling the relationships between room and chair orientations, Witkin (et. al., 1954) found that some subjects consistently oriented the room or chair according to the prevailing visual field; others invariably aligned the chair or room close to or at the vertical. Latter subjects appeared to ignore the surrounding visual context, relying instead upon kinesthetic sensations of postural response to gravitational pull. It seemed, therefore, that some subjects' reliance upon visual cues appeared to overpower gravitational force corresponding to the true upright. It was also noted that the room-chair conditions required the subject to use himself as a variable or referent for vertical alignment, and elicited a complex system of internal cues, including a kinesthetic-visual combination.

In a subsequent investigation, Witkin and his collaborators (1954) devised the Rod and Frame Test (RFT), a modification of the Tilting-Room-Tilting-Chair mechanism consisting of a room whose interior was painted black to minimize visual cues. A luminous, square frame with a florescent rod attached to its center was placed on the wall facing the seated subject. Rod, frame, and subject's chair could be rotated independently by the experimenter. Subjects' task was to align the rod to vertical regardless of the frame's or chair's tilt. All test conditions correlated highly in subjects' scores of total degrees of deviation from vertical.

Performance on the Tilting-Room-Tilting-Chair Test and on the Rod and Frame Test were clearly related, and appeared a function of degree to which subjects were influenced by the prevailing visual context, and their mode or perceiving an object in relation to its surroundings or themselves. Accordingly, the role of kinesthetic cues as a predominant factor in spatial organization was discarded in favor of individual perceptual styles (Witkin, et. al., 1954). Subjects able to overcome influence of a surrounding perceptual field by distinguishing its parts from the whole were described as "field-independent"; those less able to perceive parts of a field as discrete, resulting in response to the entire perceptual array, were termed "field-dependent".

The Embedded Figures Test (EFT) was developed to determine whether these perceptual styles characterized perceptions other than spatial and upright perception. Adapted from Gottschaldt's Hidden Figurest Test (1926), the EFT required separation of an item from its surrounding field, and contained eight different, simple, geometric figures hidden

PS005674

among 24 complex, geometric drawings colored to enhance their difficulty. Subject's task was to locate or 'disembed' the simple figure in each complex drawing; his score was total mean time taken to disembed all concealed figures. As hypothesized, subjects with a high mean score on disembedding time aligned themselves to the room and the rod to the frame; those with a low mean time score on disembedding oriented themselves or rod to the true upright in all tasks. Thus, styles of field-independence-dependence held constant across perceptual tasks, prompting Witkin (1954) to conclude that ability to separate any item from its surrounding context reflected the capacity to perceive analytically by maintaining a 'set' against field influence. Further, this ability to disembed was considered not only the essence of the field-independence-dependence dismension (FID), but also the main characteristic of a general perceptual style.

Further investigations by Witkin and his associates (1954) assessed whether field-independence-dependence could be expanded to encompass other areas of psychological functioning. Measures studies included the Thematic Apperception Test, the Rorschach, the Draw-A-Person Test, the Weschler Intelligence Scale for Children (WISC), the Weschler Adult Intelligence Test (WAIS), and personal interviews of subjects and their mothers. Analyses of correlates among perceptual, personality, and intelligence tests were interpreted by Witkin (1954) to indicate that field-dependence was related to a passive, global manner of experiencing the environment, while active, analytic interaction characterized field-independence. Females and younger children were more variable in performance and more dependent upon the visual field than were males

and older children who exhibited a perceptual style independent of the prevalent visual stimulus. Psychiatric patients scored at extreme ends of the FID continuum, suggesting a correspondence between personality pathology and extreme perceptual style. WISC and WAIS score analyses yielded three subtest clusters: verbal, attention-concentration, analytical. Only the latter, as represented by the Block Design, Object Assembly, and Picture Completion subtests, correlated significantly with FID, field-independent subjects being superior to field-dependent subjects on these measures. The Draw-A-Person Test was interpreted as a field-independence-dependence measure called Articulation-of-Body-Concept (ABC) which considered degree of body articulation the extent to which the human figure was depicted with discrete parts and specific boundaries. Faterson and Witkin (1970) reported ABC scores at successive ages consistently higher for field-independent than field-dependent subjects, unrelated to Full Scale WISC IQ, but associated with its analytic cluster.

Subsequent investigations by Witkin and his colleagues (Faterson, 1962; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962) supported the foregoing research, and led to expansion and modification of FID as a cognitive style dimension. Results were interpreted to suggest the terms "field-independent" and "field-dependent" inappropriate due to emphasis upon perception. An individual's perceptual mode, Witkin suggested, was but one of a larger constellation of interrelated components which together reflected an individual's level of psychological differentation. Accordingly, the designation "global-analytic

articulation" was adopted to represent a broader dimension of cognitive functioning.

Further explorations of the global-analytic construct yielded evidence of stability across tasks and time, with field approach styles a function of sex and age (Witkin, et. al., 1962). Data from a developmental sample demonstrated that FID was identifiable at age eight, and that girls and younger children were more field-dependent than boys and older children.

Results of a longitudinal study (Witkin, Goodenough, & Karp, 1967) which included two age group samples (10-24 years; 8-13 years) yielded support for Witkin's hypotheses: differentiation increased with age; individuals' performance remained stable relative to group placement; females tended more toward field-dependence on all tasks than males. Instrumentation problems arose, however, prompting Witkin to conclude that not all his perceptual tests were suitable for children. As the RFT and EFT proved too difficult or confusing, modifications were necessary. Research from the Witkin group and others yielded adaptations of adult measures for children.

The Children's Embedded Figures Test (CHEF) (Goodenough & Eagle, 1963) featured large, wooden picture puzzles, each containing an embedded geometric figure of a tent or house. One of the knobs affixed to all puzzle pieces could be lifted by the subject to remove the segment containing an embedded figure. Reliability and validity coefficients between the EFT and CHEF were moderately high. As the test lacked portability and was difficult for subjects to manipulate because of size and weight, further modification was necessary.

Karp and Konstadt (1963) revised the CHEF into the Children's Embedded Figures Test (CEFT). Many pictures of the former were used in the latter, a paper test scored according to number of items disembedded. Standardization on 160 children, ages 5-12, yielded no significant sex differences,although performance improved with age for both sexes.

As Banta, Sciarra, Sinclair, Jett, and Gilbert (1969) found the CEFT too difficult for preschool and low SES children, they developed the Early Childhood Embedded Figures Test (EC-EFT) for children 3-6 years of any economic or cultural background. This test, hereafter referred to as Banta's EFT, required subjects to disembed a geometric form similar to an ice cream cone in 14 stimulus pictures, with total score the number of trials correct. When published (1969), concurrent validity between Banta's EFT and those of Witkin's associates had not been established, although usage of Banta's form may be defended on the basis of face validity.

Adaptations of the Rod and Frame Test arose from a different need than Embedded Figures Test modifications. Although children performed readily on the RFT, its attachment to Witkin's laboratory wall required subjects to be transported to his facility. To remedy this situation, Oltman (1968) and Gerard (1969) designed independently a portable RFT. The Oltman apparatus, a small, table-top model, was standardized on 163 college students, also administered Witkin's original RFT and EFT. Pearson r values for performance between the portable and standard RFT were: total group, .90; males, .90; females, .89. Values of r for RFT and EFT relationships were .60 and .56, for the portable and standard apparatus, respectively. Although sex differences were not significant,

scores were in the expected direction. Results were interpreted as warranting usage of Oltman's apparatus when Witkin's model was inaccessible.

Gerard's apparatus (1969) provided a game atmosphere on the assumption children are intrinsically interested in playing any game, particularly one with meaning. Accordingly, the rod was given a meaningful shape by modifying it into a man's silhouette. The apparatus consists of a rectangular, wooden box measuring 4' long by 1 1/2' high and wide. The man-shaped rod and a square frame are attached to one interior wall; subjects sit at the opposite end with their face against a cushioned opening. Witkin's four rod and frame settings are used; subjects' responses are visible to and recorded by the investigator seated in front of exterior controls. Gerard's test has been utilized in recent studies with children 4-13 years (Canavan, 1969; Hirsch, 1969; Keogh & Donlon, 1971; Roth, 1970; Weiss, 1971) on the assumption it is a valid measure of FID. Although it has not been validated against Witkin's RFT, usage may be defended on the basis of face validity.

In sum, Witkin's field-independence-dependence construct has been shown to differentiate groups in terms of sex, age, intellectual factors, and personality characteristics. Modification of test instruments have rendered them appropriate for young children, and feasible for use in school settings.

History of Kagan Research

Jerome Kagan and his associates (Kagan, Moss, & Sigel, 1963) began investigation of cognitive styles following observations of individual differences on tasks requiring separation of human figures into meaning-

ful categories. Some individuals selected specific subelements of figures as the primary basis for grouping, while others regarded each stimulus as a whole and classified figures on the basis of shared relationships. The former group were considered "analytic", the latter "relational" in mode of stimulus differentiation. Analytic subjects appeared to differentiate a complex configuration on the basis of discrete subelements; the tendency to perceive the whole gestalt of a perceptual field with relative lack of differentiation among elements was displayed by relational subjects. Moreover, individuals demonstrating analytic differentiation were behaviorally more independent, ambitious, concerned with intellectual mastery, and desirous of recognitiion than were relational subjects. These observations led Kagan to propose that individual differences in conceptual style demonstrated by analytic and relational differentiation were similar to Witkin's dimension of field-independence-dependence.

In investigations focusing upon children, Kagan and his colleagues (Kagan, et. al., 1963) examined antecedent conditions influencing development and maintenance of the analytic attitude, using the Conceptual Style Test (CST). This test required subjects to select from a group of stimuli those that "were alike or went together in some way". Items were constructed to elicit either analytic or relational responses as the basis of grouping. Support for generality of the analytic construct was lent by findings that boys who performed analytically on the CST tended to be analytic in other tasks of figure sorting, word association, and serial learning. Correlations between conceptual approach and group IQ scores indicated analytic attitude more closely related to performance

on items requiring perceptual differentiation than those assessing language skills. Girls' results were less consistent and revealed no strong relationships between analytic attitude and the tests administered, prompting Kagan to suggest analytic responses were of different significance for each sex.

Subsequent investigations (Kagan, et. al., 1963) focused upon stability of conceptual style over time, taking into account response time and differentiation of ambiguous and complex stimuli arrays. Analytic responses were found to be highly stable for girls and moderately stable for boys over a year period; relational responses showed parallel stability coefficients. Nearly all boys increased in number of analytic responses, while only half the girls demonstrated slight increases. Data were interpreted to suggest elements of cognitive organization may be less rigidly established in boys than in girls. On tasks requiring differentiation of ambiguous or complex stimulus arrays, analytic children were able to distinguish figure-ground relationships in abstract geometric designs by separating the salient from the irrelevant features, thereby differentiating the stimulus environment. Poor performance of girls was interpreted concordant with Witkin's finding that girls are more field-dependent than boys; additional evidence for the strong analytic attitude in males was provided by Weschler's normative data that males perform better on tests requiring analytic orientation.

Analyses of response latencies on all tasks revealed analytic style was indicative of a reflective approach in which response was delayed but correct, while relational style was associated with responses of short latency and frequent errors. The former approach to conceptual

analysis was termed "reflectivity", the latter response mode described as "impulsivity". Thus, the reflectivity-impulsivity construct was two-dimensional, involving the combination of response latency and perceptual accuracy. Data from the Fels Institute studies suggested analytic style was associated with a reflective attitude, a tendency to differentiate experience, and ability to resist effects of distracting stimuli upon ongoing behavior. Relational style, however, was characterized by an impulsive approach, a more reactive tendency to external stimuli, and inability to differentiate complex stimuli (Kagan, et. al., 1963).

Kagan and his associates (Kagan, Rosman, Day, Albert, & Phillips, 1964) further explored immediate and antecedent determinants of differentiation styles among children with a variety of tests, several of which they designed. Such measures included the Hidden Figures Test (HFT), the Design Recall Test (DRT), the Picture Discrimination Test (PDT), the Draw-A-Face Test (DAF), the Visual Analysis Test (VA), the Haptic Visual Matching Test (HVM), and the Matching Familiar Figures Test (MFF). The MFF required subjects to select from 6 facsimilies the one exactly matching a standard figure in each of 12 pictorial stimuli sets depicting familiar objects. Due to the accuracy with which it appeared to assess reflectivity-inpulsivity, Kagan used this test most frequently.

On the basis of administration of these tests to several hundred children in grades one through four, negative relationships were found between variables of response time, recognition errors, and verbal ability on perceptual recognition tasks and WISC verbal subtests. Overall,

boys produced more analytic concepts and fewer recognition errors than did girls, whereas girls tended to have longer response times. No sex differences in errors or response latency appeared on the MFF, but inverse correlation between response time and error scores was highest on this test. Relationships between response time and age suggested reflection over alternative solutions increased as children matured (Kagan, et. al., 1964).

Results were interpreted to indicate that two major fundamental cognitive dispositions contributed to production of analytic concepts: the tendency to reflect over alternative solutions or classifications in situations where several possible responses were available simultaneously; and, the tendency to analyze visual arrays into their component parts. These dispositions appeared relatively independent of each other, and orthogonal to verbal repertoire; both influenced analytic groupings and recognition errors. The complementary role of visual analysis and reflection in producing infrequent recognition errors was considered tenable, for selection of the correct variant on the first attempt required analysis of each stimulus into its components, inhibition of immediate reporting of initial hypotheses, and evaluation of alternative solution possibilities. In sum, the capacity to delay in the service of reflection, combined with a predisposition toward visual analysis, appeared critical factors of analytic conceptualization and differentiation.

In subsequent investigations, Kagan and his colleagues confirmed results of the foregoing research, and analyzed the relevance of

conceptual styles upon educational task performance. Children classified as impulsive in the first grade committed significantly more reading errors on tests of letter and word recognition at the end of the second grade than did reflective children. High correlation (.91) between number of head-eye fixations and response latency on the MFF was interpreted as indicating subjects actively considered alternative solutions during response delay, an accurate decision time index. Kagan (1965) suggested response styles may be a determinant of reading performance and remedial programs need acknowledge their relevance. Kagan, Pearson, and Welch (1966a) found that reflective first graders displayed significantly fewer errors on inductive reasoning tasks than did impulsive children, even with verbal ability statistically controlled. Correlations between head-eye fixation and response latency replicated earlier findings (Kagan, 1965). Results prompted Kagan to suggest reflection training might enhance performance on school subjects requiring inferential analysis. When serial learning tasks were administered under different conditions to third grade children previously classified as reflective or impulsive (Kagan, 1966b), reflective children demonstrated superior recall, while impulsive subjects made more errors of commission, corroborating earlier evidence that such children do not pause to consider the probable accuracy of their cognitive products. Kagan therefore emphasized the significance of a conceptual tempo variable in intellective performance.

Modification of conceptual style was attempted with some success. Kagan, Pearson, and Welch (1966b) trained impulsive first graders to

produce response latencies comparable to that of reflectives, but error rate was not affected. Training under conditions of perceived high similarity between subject and investigator facilitated longer response latencies for some girls, but not for boys. Yando and Kagan (1968) reported exposure to teachers with a preferred response style influenced students' response mode, the effect most prominent for impulsive boys with reflective teachers.

In sum, Kagan (1966a, 1967; Kagan & Kogan, 1970) concluded that degree of reflection displays intraindividual stability over time and marked generality across tasks. These data, therefore, were interpreted as providing an empirical basis for suggesting the tendency to delay, inhibit, or process slowly, in contrast to a more rapid tempo, might be a fundamental behavioral dimension within personality structure.

Attempts to replicate and extend Kagan's data are ever forthcoming. Researchers have modified his tests to increase their suitability with available samples. As Banta and his associates (Banta, et. al., 1969) have modified Witkin's Embedded Figures Test, so have they revised Kagan's Matching Familiar Figures Test. Since Kagan's MFF was found too difficult for preschool and low SES children, Banta developed the Early Childhood Matching Familiar Figures Test (EC-MFF) for children 3-6 years of any economic or cultural background. The EC-MFF, hereafter referred to as Banta's MFF, required subjects to select from 3 to 6 facsimilies the one exactly matching a standard figure in each of 12 pictorial stimuli sets, with total score the number of trial correct. When published (1969), concurrent validity between Banta and Kagan's MFF measures had

not been established, although usage of Banta's version may be defended on the basis of face validity.

Relationships Between Witkin & Kagan Constructs

Kagan's dichotomy of cognitive style may be related to Witkin's field articulation construct for both stress a perceptual variable related to the manner in which a complex stimulus array is perceived and analyzed. Analytic differentiation and field-independence require the ability to perceive and separate an item from an embedding context by responding selectively to relevant cues. Relational perception and field-dependence, however, are characterized by the inability to perceive parts of a field as discrete, resulting in response to the entire stimulus configuration. Moreover, analytic-relational differentiation and global-analytic articulation are considered fundamental dimensions of a general cognitive style by their respective theorists. Of further significance are five critical factors of individual differences in cognitive functioning concordant between Witkin and Kagan's constructs: intellective, sex-linked, behavioral, developmental, stability across tasks and time.

Intellective. Early observations of significant relationships between general intelligence and performance on perceptual tests suggested to Witkin (1954) and Kagan (1963) that differentiation styles might simply be a function of individual differences in general intelligence. Factor-anlytic studies examining relationships between measures of intelligence and field articulation styles (Witkin, 1962, 1965b) yielded fairly consistent results. WISC and WAIS IQ score analyses revealed three

subtest clusters: verbal, attention-concentration, analytical. Only the latter, as represented by the Block Design, Object Assembly, and Picture Completion subtests, correlated significantly to performance on the Witkin perceptual measures. Witkin concluded field-independent subjects were intellectively superior to field-dependent subjects only in analytic ability as no differences between these groups were found on verbal and attention-concentration WISC subtests.

Similar results were reported by Kagan (1963) who found analytic style of conceptualization correlated moderately with CTMM nonverbal subtests, but not its verbal measures. Analytic style also correlated significantly with WISC Picture Completion and Picture Arrangement subtests, but not to Vocabulary and Information subtests.

Sex-linked. Witkin and Kagan reported consistent differences between boys' and girls' performance on their respective tests. Witkin's (1954) research indicated females, as a group, were more variable in performance and more field-dependent than were males on all tasks requiring analytic field articulation. These observations were consistently reported at all developmental levels, and across cultures of Western Europe, Israel, Hong Kong, and Sierra Leone, Africa (Witkin, 1965a).

Kagan (1963) reported similar sex differences in conceptual style, particularly on tests requiring analytic orientation for complex stimulus array differentiation. Boys consistently performed better than girls on tasks demanding separation of salient from irrelevant features to differentiate the stimulus environment, which Kagan interpreted as concordant with Witkin's finding of girls' greater field-dependence.

Behavioral. Witkin and Kagan reported consistent behavioral characteristics differentiating between subjects. Witkin (1954, 1962) found field-dependence related to a passive, global manner of experiencing the environment, while active, analytic interaction characterized field-independence. Persons with an articulated cognitive style demonstrated a developed sense of separate identity, experience of the self as structured, and internalized frames of reference available as guides for self definition. Those with a global cognitive style exhibited a less developed separate identity which manifested itself in reliance upon external sources for definition of attitudes, judgments, sentiments, and views of themselves. In sum, field-independent subjects, in contrast to field-dependent ones, were more independent, self-reliant, insightful, and self-confident (Witkin, 1965a).

Kagan (1963) reported similar behavioral patterns: analytic subjects were rated independent, ambitious, self-confident; relational subjects were found passive, anxious, dependent upon peers, and not overly ambitious. Fel Institute research data suggested analytic style was associated with a tendency to differentiate experience, while inability to differentiate complex stimulus situations characterized relational style.

Developmental. Consistent developmental trends in field articulation and cognitive style were found by Witkin and Kagan via longitudinal investigations. Witkin (1954, 1962, 1967) reported younger children, as a group, tended to be more field-dependent than older children, with analytic articulation increasing with age. From subject-mother interviews

and comparison of their mutual performance on perceptual tests, Witkin (1954, 1962) concluded a mother's differentiation mode played an important role in fostering development of her child's cognitive style.

Kagan and his colleagues (1964) reported similar developmental trends; subjects were relatively self-consistent in response style and differentiation mode across tasks and time, the number of analytic, reflective responses an increasing linear function of age.

Stability Across Tasks and Time. Witkin and Kagan reported relative inter- and intraindividual stability across tasks and time; both attempted modification procedures to assess extent of stability under duress. Witkin (1954, 1962, 1967, 1970) presented intercorrelations between his perceptual and personality tests, including concurring longitudinal data, as evidence indicating stability of FID across tasks and time. Moreover, individuals' performance remained self-consistent and stable relative to group placement over time. Further support for FID stability was provided by unsuccessful attempts to alter global-analytic articulation with experimental intervention techniques including drug administration, electro-convulsive shock, stress due to anticipated heart surgery, hypnosis, and special training (Witkin, 1965a).

Similarly, Kagan (1964, 1966a, 1968, 1970) reported longitudinal data on correlations of response style and differentiation mode across tasks and time. Attempts at modification yielded somewhat positive results: impulsive subjects were trained to produce response latencies comparable to reflective subjects, but without concomitant error decrease; conditions of perceived high similarity between subject and

investigator facilitated longer response times for some impulsive girls; exposure to reflective teachers influenced students' response mode, particularly impulsive boys.

Related Research: Witkin and Kagan

The degree of relationship between Kagan and Witkin's constructs and their implications for education has been the subject of considerable recent research. Some investigations were conducted in conjuction with Witkin or Kagan and their sample populations; others were performed independently.

Witkin (1965b), citing evidence describing the relevance of field articulation in educational contexts, reported that field-independent children were superior to field-dependent ones in problem solving tasks requiring disembedding skills. Witkin also suggested that extent of similarity in cognitive style between teachers and their pupils affected students' educational performance. Davis (1967) synthesized studies of individuals' cognitive styles and performance on a variety of learning tasks, concluding that recall and recognition of social words presented incidentally correlated significantly with field-dependence; that field-independent subjects were superior to field-dependent ones in a reversal-nonreversal concept identification task; and, that field-independent subjects scored significantly higher on a perceptual concept formation task than did field-dependent subjects. In terms of application of the Witkin construct, Canavan (1969) used the Gerard Rod and Frame Test to assess field-independence-dependence over a two year period in terms of

age, sex, ethnicity, and IQ, finding that field articulation increased with age, differentiated between sexes and races, and correlated with school achievement and psychometric performance. Watson (1969) administered the reading portion of the Stanford Achievement Test, the CEFT, and the Draw-A-Person Test to normal first and second grade boys, finding a significant relationship between reading achievement and ability to disembed. Hirsch (1969) described the performance of 8-10 year old boys with learning disabilities on the GRFT and MFF, finding a significant correlation between field approach and conceptual style. Keogh and Donlon (1971) compared the GRFT and MFF performance of normal boys to that of 8-13 year old boys with learning disorders, finding the latter population significantly higher in field-dependence and impulsivity. Roth (1970) administered the GRFT and CEFT to normal 7 year old boys and girls, reporting field-independence-dependence identifiable at this age and related to sex, with boys more field-independent and girls more field-dependent.

Kagan also demonstrated the relevance of the conceptual style construct in educational settings, reporting that impulsivity adversely affected reading achievement (1965), inductive reasoning (1966a), and serial learning (1966b). Yando and Kagan (1968) discovered that a teacher's style of reflectivity-impulsivity can affect the response time of her students. Messer (1969) administered the MFF to third grade boys before and after experimental conditions designed to induce success or failure on an educational task, finding increases in response times and

decreases in recognition errors among subjects most anxious over their task performance quality. Messer (1970) also reported stability of response latencies over 2 1/2 years among children, with those failing a school grade more impulsive than their peers, although of comparable verbal intelligence. Drake (1970) used a Mackworth eye camera to record on film MFF eye fixation patterns of third grade children previously classified as reflective or impulsive by Kagan under ordinary MFF test conditions. During the first 6 seconds of each item, reflective children made more homologous comparisons of similar details across variants than did impulsive children, a molecular scanning behavior required by various educational tasks. In sum, studies of the reflectivity-impulsivity construct have supported its importance in an educational setting.

Of seeming relevance to Witkin and Kagan's constructs of cognitive style, was the accidental, but highly provocative, observation made by Roth (1970) in her study of field approach that boys appeared task oriented during GRFT administration by seldom verbalizing, while girls chattered about irrelevant matters, seeming to seek the investigator's approval or possibly extraneous cues for enhancing their performance. Similar observations made by Keogh (1970b) in a study of spatial organization among 4-5 year old preschool children lent support to Roth's findings, and suggested the need for analysis of verbal responsiveness in relation to field-independence-dependence and reflectivity-impulsivity.

Related Research: Verbal Responsiveness and Social Dependence

Empirical justification for the investigation of verbal responsiveness in relation to field-independence-dependence and reflectivity-impulsivity may be extrapolated from Zigler's prolific research with mental retardates and normals on social dependency as a motivating force for task perserverance (Green & Zigler, 1962; Zigler, Hodgen, & Stevenson, 1958). Proximity of and amount of social interaction provided by the investigator was found to increase task perserverance of institutionalized retardates more than that of noninstitutionalized retardates and normals. Furthermore, the latter groups attended to the tasks presented, making few irrelevant statements, while the former made comments directed toward increasing social interaction with the investigator.

A five and an eight year follow-up study (Zigler, Butterfield, & Capobianco, 1970) replicated earlier results and found amount of social interaction sought by institutionalized retardates was a function of pre-institutional social deprivation; children from highly deprived backgrounds demonstrated greater decreases in social reinforcement motivation, suggesting that institutional experience was more socially debilitating for retardates from relatively good homes than those from poor homes.

The findings that retarded children were more sensitive to cues provided by an adult than normal children of the same mental age led Zigler and his associates (Yando & Zigler, 1971) to consideration of a general problem solving style which they referred to as "outerdirectedness".

This style was defined as the degree to which a child used external or environmental cues, particularly those provided by social agents, in the belief these cues were more reliable indicators for problem solving than his own cognitive resources. Two factors were advanced as determinants of degree of outerdirectedness: general level of cognitive development; relative incidence of success experienced when employing one's own cognitive resources in problem solving situations. In general, the lower a child's cognitive level, the more outerdirected he became, since outerdirectedness was more conducive to successful problem solving than was reliance upon poorly developed cognitive abilities. Yando and Zigler (1971) found normal younger children more outerdirected than normal older children of any age and retarded children more outerdirected than normal children.

In an earlier investigation, Kohlberg and Zigler (1967) assessed verbal dependence, a presumed indicator of outerdirectedness, among normal children in relation to sex of subject and experimenter. By adapting Gewirtz's verbal dependence classification scale, Kohlberg and Zigler reported verbal dependence a decreasing linear function of age, with girls initially higher and declining more sharply than boys over time. Bright children of both sexes were initially (age 4) higher in verbal dependence than average children; their dependence, however, declined more rapidly with age than did that of average subjects, particularly boys. Consideration of sex of subject and sex of investigator in relation to subjects' verbal dependency revealed that bright children

were more male-oriented at age 4 than average children who were female-oriented. However, Gewirtz and Baer (1958) and Stevenson (1961) demonstrated that a female experimenter was a more effective social reinforcer than was a male investigator with children of both sexes at age 4, suggesting use of a female experimenter in studies with young preschool children to maximize reinforcement effectiveness.

Relationships between outerdirectedness, or verbal responsiveness, sex differentiation, and task performance style among young children may be interpreted from the foregoing research. The motivative effects of social interaction upon institutionalized retardates' task perserverance reported by Zigler (1958, 1962, 1970, 1971) were also found for girls and bright children by Kohlberg and Zigler (1967). Both Keogh (1970b) and Roth (1970) observed that task orientation of boys and social dependency of girls appeared to affect their respective performance upon tests of spatial organization and field approach. Further evidence for suggesting such a relationship may exist was cited by Davis (1967). He noted that Konstadt and Forman, associates of Witkin, reported that global oriented children, when anxious about their performance on Witkin's tests, looked up at the investigator's face nearly twice as often as did children with an analytic cognitive style. According to Davis, Crutchfield, Woodworth, and Albrecht found global individuals were better than were analytic subjects at recognizing and recalling faces of people they had been with previously; and, Messick and Damarin observed that field-dependent subjects showed greater incidental learning than did field-independent subjects when test material consisted of human faces. Witkin (1962) reached similar conclusions, noting that field-independent subjects demonstrated greater incidental learning

with nonhuman rather than human test materials. In toto, these studies may be interpreted to suggest that persons with a global style of field approach are particularly attentive to human faces, a major source of social cues to what others might be thinking, feeling, or expecting.

While the implied association between verbal responsiveness, sex differences, and task orientation may appear tenous, the extensive review of the literature on sex differences in mental and behavioral traits compiled by Garai and Scheinfeld (1968) ennumerates a horde of studies in which females were found to be more auditorially, socially, and verbally oriented than males from infancy. Such research in conjunction with that reported by Zigler, Keogh, Roth, and Davis provides the basis for suggesting assessment of verbal responsiveness in relation to sex, field articulation, and response style.

Summary

The research summarized within this chapter may be interpreted to suggest a perceptual and conceptual variable which is common to field-independence-dependence and reflectivity-impulsivity, related to sex and verbal responsiveness, and possibly identifiable during early childhood. Inasmuch as longitudinal developmental studies (Bayley & Schaefer, 1964; Sontag, Baker, & Nelson, 1965) have demonstrated substantial correlations between performance on cognitive tasks as early as age 5 to adulthood, further research on the origins of styles of field approach and conceptual organization in young children is needed.

Purpose

This study was designed to determine whether styles of field-independence-dependence and reflectivity-impulsivity are identifiable in normal preschool children, and to assess whether sex differences related to field-independence-dependence and reflectivity-impulsivity exist in this population. This study was also designed to assess the utility of modified field-independence-dependence and reflectivity-impulsivity test instruments developed for preschool children. An additional assessment variable considered was that of verbal-independence-dependence (VID), as it related to performance on field-independence-dependence and reflectivity-impulsivity measures. From research presented within this chapter, these hypotheses are drawn:

1. There will be a significant range of individual differences in scores of field-independence-dependence, reflectivity-impulsivity, and verbal-independence-dependence within a group of four and five year old preschool children.

2. There will be significant relationships among these measures, with field-independent subjects more reflective, verbally-independent, and evidencing a greater articulated body concept than field-dependent subjects.

3. Boys will be more field-independent, reflective, and verbally-independent than will girls.

Field-independence-dependence was assessed by the Gerard Rod and Frame Test, Banta's Embedded Figures Test, Harris' version of the Draw-A-Person Test, and Witkin's Articulation-of-Body-Concept analysis. Reflectivity-impulsivity was measured by Banta's version of the Matching Familiar Figures Test. Verbal-independence-dependence was determined by Kohlberg and Zigler's adaptation of Gewirtz's verbal dependence scale.

CHAPTER II

METHODS

Subjects

Subjects were selected from the current population of four and five year old children in a southern California preschool located in a predominately white, middle class community. The final sample consisted of 23 girls and 23 boys. Mean age in months for the total group was 57.30 (S.D.=3.69); for girls: 57.00 (S.D.=4.00); for boys: 57.61 (S.D.=3.42). Mean I.Q., assessed by Harris' version of the Draw-A-Person Test (Harris, 1963), for the total group was 106.61 (S.D.=16.69); for girls: 109.22 (S.D.=17.01); for boys: 104.00 (S.D.=16.32). Differences in chronological age and I.Q. between girls and boys were not statistically significant. Ethnic composition of the final sample included 45 Caucasians and one Oriental, a girl.

Instruments

Subjects were individually administered the Gerard Rod and Frame Test (Gerard, 1969), Banta's versions of the Embedded Figures Test and Matching Familiar Figures Test (Banta, Sciarra, Sinclair, Jett, & Gilbert, 1969), and the Harris revision of the Draw-A-Person Test (Harris, 1963). Tests were administered in the order described. Gewirtz's Verbal Dependdency Scale (Kohlberg & Zigler, 1967) was administered in conjuction with all measures save the Gerard Rod and Frame Test. Each task required approximately 10 minutes to administer, with total testing time being 40-45 minutes per subject; testing was accomplished in two sessions per child.

Gerard Rod and Frame Test (GRFT)

The GRFT is a portable modification of Witkin's apparatus which requires the subject to position a silhouetted figure, instead of a rod, to the true upright. Although comprehensive normative data and reliabbility and validity coefficients for performance on the GRFT in relation to Witkin's RFT are lacking, the GRFT possesses face validity, and has been found to distinguish field-independence-dependence in subjects 5-13 years old (Canavan, 1969; Hirsch, 1969; Keogh & Donlon, 1971; Roth, 1970).

The portable rod and frame apparatus consists of a rectangular, wooden box measuring 48" long, 18" high, and 18" wide. On one interior end is mounted a 12" square frame which the investigator can rotate in any direction by manipulating an externally placed clear, plastic, arrow-shaped dial. An 8" high silhouette of a man affixed to a rod mounted at the frame's center may be moved independently by an external brass armature. Positions of man and frame are indicated on a protractor adjoined to their exterior controls which serves to standardize experimental settings of man and frame, and to allow recording of the number of degrees the subject's setting of the man deviates from the true vertical. Both man and frame are covered with luminous tape to glow in the darkened box, the interior of which is finished in black matte paint; the blackened interior serves to minimize possible cues afforded by walls, ceiling, and floor of the box. An electric light within the box was turned on before testing to ensure sufficient light absorption by the luminous tape; the light was off during testing. At the opposite end of the box is a hooded, foam-rubber, cushioned opening through which the subject observes. Just within is a wooden baffle which the investigator

lowered between trials by a string to block the subject's view of man and frame settings. Below the opening is a knob the subject turned to adjust the man whose movements are visible to and recorded by the investigator seated at the opposite end in front of the controls. A schematic representation of the GRFT is found in Appendix A.

Administration of GRFT GRFT administration consisted of 12 trials divided into three blocks of four trials each. The four rod and frame settings used by Witkin (1954, 1962) were thus repeated thrice: (a) rod and frame 28° left; (b) rod 28° left, frame 28° right; (c) rod 28° right, frame 28° left; (d) rod and frame 28° right. In all 12 trials, the objective was to orient the man to the true upright, irrespective of the frame's position. A schematic represention of settings is found in Appendix B.

Subjects were led individually into the semi-darkened testing room and introduced to the two investigators. Throughout testing, one investigator interacted with the subject by giving all directions; the other sat at the opposite end of the apparatus manipulating its dials and recording the results. To ensure test instructions would be comprehended, each subject played the following game of standing "straight and tall" with one investigator prior to GRFT administration:

> We're going to play a game before you get to look into the 'magic box.' Look at the way I'm standing. Am I standing straight and tall? (Subject nodded yes.) Let's see if you can stand straight and tall. (Subject did so.) Good! Now look at the way I'm standing. (Investigator leaned to one side.) Am I standing straight and tall? (Subject nodded no.) Right! I'm crooked, and now I'm standing straight and tall. (Investigator rightened self.) Let's see if you can stand crooked and then make yourself stand straight and tall. (Investigator

gently leaned subject to each side; subject rightened self to vertical.)

The subject was then seated in front of the box with his face against the cushioned opening while this investigator sat at his side and asked:

> What do you see inside? (Subject usually replied, 'A man.') That's right. It's a man. You can make the man turn in any direction with this knob. (Investigator showed knob below opening to subject and turned it to demonstrate man's mobility.) Can you make the man turn around in all directions? (Subject did so.) Very good!

Testing then commenced with lowering of the baffle and these instructions:

> Look! The man has disappeared. When the man comes back, I want you to make him stand straight and tall, just as if he were standing in this room beside you. You will make him stand straight and tall by turning the knob in front of you.

The baffle was then raised, and the subject told:

> There's the man. Now, make the man stand straight and tall just as if he were standing in this room beside you.

Prior to each trial, the subject was reminded to "make the man stand straight and tall." At no time was any reference made to the frame or its position by the investigator. After the last trial, the frame remained set 28° to the right, and the subject was asked to "make the man stand on his head."

Scoring of GRFT Using the protractor on the control panel, the second investigator recorded the number of absolute degrees and direction of deviation of the man from the true vertical on each trial. A sample score sheet is found in Appendix C. The first block of four trials constituted practice; scores from trials of the second and third blocks were used for data analyses. A high mean error from the true

vertical summed over eight trials indicated field-dependence; a low score signified field-independence. Data were not recorded for making the man "stand in his head"; this observation came from investigator curiosity to see if subjects would invert the man in accordance with their performance on the upright, and the frame's position.

Banta Embedded Figures Test (EFT)

As the Embedded Figures Tests devised for children by Witkin's associates (Goodenough & Eagle, 1963; Karp & Konstadt, 1963) were standardized on 5-12 year old subjects, the Banta version (Banta, Sciarra, Sinclair, Jett, & Gilbert, 1969) developed for children 3-6 years was used in this study. Correlations between performance on Banta's EFT and on the Witkin group's Embedded Figures Tests are lacking; at present, Banta's version may be defended only on the basis of face validity.

Banta's EFT requires the subject to disembed a geometric form similar to an ice cream cone in 14 stimulus pictures of gradated difficulty. Some pictures are realistically illustrated, others geometrically designed; the cone shape to be disembedded is the same size and placed in a vertical position in all pictures. Pictures were printed on 8 1/2" x 11" white bond paper inserted into clear, plastic folders preventing smudges or tears; the folders were adjoined by three metal rings to facilitate usage and maintain administration order. Training materials included presentations of four ice cream cones made from cardboard covered with appropriately colored construction paper, and three stimulus pictures, each depicting an ice cream cone in a different mode (geometric, naturalistic, realistic) and location on the page. A schematic representation of Banta's EFT is found in Appendix D.

Administration of EFT Test manual instructions were somewhat modified to expedite administration and to ensure each subject understood the form he was to disembed. Subjects were individually led into the testing room by the investigator and seated to her left in front of a table. Cardboard representations of four ice cream cones of different colors (white, pink, yellow, green) but equal size, were placed on the table before the subject by the investigator who inquired:

> Do these remind you of anything you have seen before? What do you think they are?

The subject usually nodded yes, and replied "ice cream cones." If the subject gave other responses, the investigator asked leading questions until the subject responded with the desired answer, to which she replied:

> That's right. They're ice cream cones. Which one do you like the best? (Subject selected one.) You're going to play the game with this one, and I'll put the others aside to keep them out of the way.

The subject was then shown the first stimulus picture and asked:

> Can you put your ice cream cone on top of the cone in this picture? Let's see you put your cone on top of the one in this picture.

As each subject did so easily, this procedure was repeated for all three training pictures. After the third one, the investigator stated:

> Now we're going to play the game. I'm going to show you some pictures. Look for the cone in each picture. When you find the cone, put your cone on top of the cone in the picture.

As the subject placed his cone atop that which he believed to be the one in each picture, the investigator murmured "fine" or "good". At no time were hints given when a subject requested help. Whenever a subject

found a picture so difficult he failed to respond after 90 seconds, he was asked if he wished to make a guess or go on to the next picture. All such subjects elected to go on, but requested being shown the cone's location to which the investigator obliged.

Scoring of EFT Responses were scored 1 if correct, 0 if not; total score was the number of trials correct. Only the first choice per stimulus picture was tabulated; scores of incorrect, initial responses were not altered when a subject subsequently corrected his errors. The number of seconds taken by the subject on each trial to disembed the cone was recorded by stop-watch. Verbal dependency was measured by Gewirtz's scale (cited in Kohlberg & Zigler, 1967). A sample score sheet for the EFT is found in Appendix E.

Banta Matching Familiar Figures Test (MFF)

The Matching Familiar Figures devised for children by Kagan and his associates (Kagan, Moss, & Sigel, 1963) is not age-appropriate to the selected sample; thus, Banta's version (Banta, et. al., 1969), designed for children ages 3-6, was used. Although reliability and validity coefficients between these MFF measures are not available, Banta's modification possesses face validity with Kagan's format.

Banta's MFF requires the subject to select from three to six alternative facsimilies the one that exactly matches a standard figure in each of 12 pictorial stimuli sets. Half the pictures are social in character (e.g. human faces, figures); the remainder are of non-social content (e.g. animals, objects). Test order alternates between the two kinds of content. All stimuli were realistically illustrated on 8 1/2" x 11" white bond paper inserted into clear, plastic folders preventing smudges

or tears; the folders were fastened together by three metal rings to facilitate usage and maintain administration order. Training materials consisted of three sets of stimuli gradated in difficulty. A schematic representation of Banta's MFF is found in Appendix F.

Administration of MFF Test manual instructions were adhered to during training and the first few trials. Instructional repetition for the remainder was eliminated when subjects demonstrated their comprehension by proceeding immediately with the task as the next set was shown before the investigator spoke.

Upon completion of the EFT, subjects were individually administered the MFF while sitting beside the investigator. The manual was opened to display the first training set, while the investigator stated:

> Look at the picture on this side. (Investigator placed hand atop single stimulus on left page.) Now look at the pictures on this side. (Investigator ran hand over opposite page.) See if you can find the one on this side (investigator placed hand on right page) that is just the same as the one on this side. (Investigator put hand on left page.) I want you to find the picture on this side (investigator indicated right page) that is exactly the same as this picture. (Investigator pointed to left page.)

This procedure was repeated for all training sets and as many trials as necessary to ensure the subject understood his task. As each subject made his selection, the investigator murmured "fine" or "good". At no time were hints given when a subject requested help.

Scoring of MFF Responses were scored 1 if correct, 0 if not; total score was the number of trials correct. Only the first choice per set was tabulated; scores of incorrect, initial selections were not changed when a subject subsequently corrected his errors. Number of correct

responses on sets of social and non-social content were tabulated separately to allow consideration of a social-independence-dependence score. The number of seconds taken by the subject on each trial to match was recorded by stop-watch. Verbal responsiveness was measured by Kohlberg and Zigler's interpretation of Gewirtz's social dependency scale (1967). A sample score sheet for the MFF is found in Appendix G.

Harris Draw-A-Person (DAP)

In the Harris version of the Draw-A-Person Test (Harris, 1963) the subject is asked to draw a whole person of either sex. Significant correlations between the Harris and Goodenough DAP tests as indices of intellectual maturity have been reported (Harris, 1963).

Administration of DAP Upon completion of the MFF, subjects were individually administered the DAP while seated beside the investigator at the same table. A pencil, eraser, and sheet of 8 1/2" x 11" bond paper were placed before the subject as the investigator instructed:

> I'd like you to draw a picture of a person.
> You can draw any person you want to. Be sure
> to draw the whole body of the person.

Whenever a subject failed to begin drawing, the investigator gave suggestions of persons he might draw, such as parents, siblings, relatives, friends, neighbors, etc. Those who drew only a face were requested to add its body. At no time did the investigator point out missing or incorrect parts. When the subject indicated his drawing was complete, the investigator asked whether the drawing was finished to ensure subject's satisfaction with his work. The investigator then asked whom the drawing represented, and complimented the subject on its quality.

Scoring of DAP Two assessment modes were applied: Harris' standardized scales of intellectual maturity (Harris, 1963), and Witkin's

Articulation-of-Body-Concept scale (Faterson & Witkin, 1970). Scores of intellectual maturity were assigned each drawing with strict adherence to instructions in Harris' (1963) text. One point was given for each body part and quality of depiction; total number of points provided a raw score which was transposed into an IQ score according to the published conversion tables.

Degree of body articulation is considered the extent to which the human figure is rendered with discrete parts and specific boundaries. In accordance with Witkin's scale, drawings were assigned a score from 1 to 5 on the following basis:

1 - Unrecognizable drawings as little or no resemblance between human figure and its depiction.

2 - Primitive, infantile drawings with sticks for arms or legs attached to faces containing few features.

3 - Drawings with some attempt at sex identification (hair-style, clothing suggested) in which attempts at shaping and a minimum of detailing are present.

4 - Drawings with definite sex identification, moderate integration of parts and body articulation.

5 - Some sophistication in mode of representation with appendages and details depicted in proper relation to body outline, high level of articulation, and sex identification.

A sample score sheet for the DAP is found in Appendix H.

Reflectivity-Impulsivity (RI)

Kagan and his associates (Kagan, et. al.; 1963) assessed reflectivity-impulsivity by measuring the subject's length of response time and error frequency on the Matching Familiar Figures Test. Subjects with long

response times and few errors were considered reflective; those with short response latencies and many errors were designated impulsive. In this study, Banta's MFF was employed to acquire data on its effectiveness as a measure of reflectivity-impulsivity in preschool children.

Scoring of RI Reflectivity-impulsivity was determined by recording with a stop-watch the number of seconds taken by the subject on each trial to disembed or match. Subjects above the median on response time but below the median on errors were designated reflective; subjects below the median on response time but above the median on errors were considered impulsive.

Verbal-Independence-Dependence (VID)

In all measures save the GRFT, verbal responsiveness was assessed in accordance with Kohlberg and Zigler's (1967) interpretation of Gewirtz's social dependency scale. The scale records the number of unsolicited social responses (SR), requests for task information (TI), declarative statements (DS), and ego responses (ER) made by the subject during testing.

Scoring of VID During administration of the EFT, MFF, and DAP, the number of unsolicited verbal responses made by the subject were classified according to Gewirtz's scale and recorded. Such scores were termed "unweighted verbal responses". Responses of each category were also given the following weighting in accordance with Gewirtz's system and designated "weighted verbal responses." Responses whose content sought investigator attention or approval were termed social and given four points each. Responses pertaining to test content or instructions were considered requests for task information and given three points each.

Comments illustrative of 'thinking aloud' to oneself about the task were deemed declarative statements and given two points each. Meaningless vocalizing or talking to oneself were termed ego responses and given one point each. Although Kohlberg and Zigler followed Gewirtz's scaling of 1/2 point per ego response, scoring of such responses in this study was altered to one point apiece to facilitate mathematical computation. Sample scoring procedures for VID are found in Appendices E, G, and H.

Setting and Order of Presentation

All tests were administered at appropriately sized tables in one room of the preschool. Excess furniture and all toys were put aside to minimize distraction.

Subjects were seen at approximately the same time of day between the hours of 10 A.M. and 3 P.M. on their regular school days and tested individually. The GRFT was administered to each subject in the entire sample first; during a separate test session a week to ten days later, the EFT, MFF, and DAP were administered in the order described.

Methods Summary

Forty-six subjects, 23 boys and 23 girls, between the ages of 50-63 months, participated in a descriptive study designed to investigate field-independence-dependence, reflectivity-impulsivity, and verbal responsiveness in preschool children. Four measures were individually administered to each subject: the Gerard Rod and Frame Test, Banta's Embedded Figures Test and Matching Familiar Figures, and the Harris version of the Draw-A-Person Test. Performance on and correlations between the measures were analyzed and related to concurrent research.

CHAPTER III

RESULTS

Comparisons were made within and between sex groups on measures of field-independence-dependence, reflectivity-impulsivity, and verbal-independence-dependence using analyses of variance and *t* tests. Relationships of performance on these measures were determined by Product-moment coefficients of correlation for the total sample, and for sex groups separately. Data were organized: (a) to describe performance on the Gerard Rod and Frame Test, Banta's Embedded Figures Test, Banta's Matching Familiar Figures Test, and the Harris Draw-A-Person Test according to total sample, and by boys and girls groups separately; (b) to consider whether field-independence-dependence was reflected in performance on the GRFT, EFT, and DAP; (c) to determine whether reflectivity-impulsivity was reflecied in MFF performance; (d) to examine relationships between verbal responsiveness and EFT, MFF, and DAP performance; (3) and, to compare relationships between age, intellectual maturity, and performance on all measures.

Gerard Rod and Frame Test (GRFT) Performance

GRFT administration consisted of 12 trials divided into 3 blocks of 4 trials each; Witkin's 4 rod and frame settings were repeated thrice. Scores were determined by recording number of absolute degrees subjects' setting of the rod deviated from the true vertical. Block 1 trials were considered practice; Block 2 and 3 scores were used for data analyses. Summarizing findings for the total sample and for sex groups separately are reported in Table 1.

Table 1

GRFT Means and Standard Deviations across Blocks for Total Group (N=46), Girls (N=23), and Boys (N=23)

Conditions	Total Group		Girls		Boys	
	M	SD	M	SD	M	SD
Block 2	49.61	57.50	72.48	66.25	26.74	35.80
Block 3	52.98	61.76	75.83	76.75	30.26	28.83
Block 2 & 3	109.20	136.95	161.39	169.61	57.00	62.45

A 2 X 2 analysis of variance was performed to compare scores according to Sex X Block Groupings. Sex differences across blocks were significant at the .01 level, with boys demonstrating smaller deviations from vertical than did girls. Effect of Block was nonsignificant. Results of the analysis of variance are found in Table 2.

Table 2

Analysis of Variance for Girls and Boys GRFT Scores on Block 2 and Block 3

Source	DF	MS	F
Between Subjects			
Sex	1	47797.91	8.22**
Error	44	5811.79	
Within Subjects			
Blocks	1	261.14	0.68
Sex x Blocks	1	.51	0.00
Error	44	384.04	

**$p < .01$.

Table 3

GRFT Means and Standard Deviations within Blocks for Total Group (N=46), Girls (N=23),and Boys (N=23)

Conditions	Total Group M	Total Group SD	Girls M	Girls SD	Boys M	Boys SD
Block 2						
Trial 1	13.09	14.26	17.39	15.21	8.78	12.09
Trial 2	12.83	19.22	19.57	23.89	6.09	9.50
Trial 3	10.43	12.37	14.43	14.05	6.43	9.06
Trial 4	13.26	19.39	21.09	23.75	5.43	8.75
Total	49.61	57.50	72.48	66.25	26.74	35.80
Block 3						
Trial 1	15.78	24.43	23.22	31.68	8.35	10.06
Trial 2	13.63	17.54	18.48	22.10	8.78	9.58
Trial 3	11.04	13.94	15.26	15.58	6.83	10.84
Trial 4	13.20	18.44	18.87	22.78	7.52	10.46
Total	52.98	61.76	75.83	76.75	30.26	28.83
Block 2 & 3 Total	109.20	136.95	161.39	169.61	57.00	62.45

Performance within blocks was then examined to determine effects of rod and frame settings for the total sample and for sex groups separately. Means and standard deviations are reported in Table 3.

Analyses of variance comparing Sex X Trials within each Block are reported in Table 4. No significant differences were found within each block for either sex, indicating rod and frame settings did not affect performance of either group. Sex differences were significant on both blocks (Block 2, $p<.01$; Block 3, $p<.05$), with boys showing smaller deviations from vertical than girls.

Table 4

Analyses of Variance for Girls and Boys
GRFT Scores on Trials of Blocks 2 & 3

Source	df	MS	F
Between Subjects			
Sex	1	6014.70	8.49**
Error	44	708.74	
Within Subjects			
Trials (Block 2)	3	80.60	0.89
Sex x Trials	3	160.03	1.78
Error	132	90.15	
Between Subjects			
Sex	1	5654.35	6.59*
Error	44	857.61	
Within Subjects			
Trials (Block 3)	3	173.64	1.09
Sex x Trials	3	89.49	0.56
Error	132	159.75	0.56

*$p<.05$; **$p<.01$.

Table 5

Product-Moment Coefficients of Correlation
between Trials and Totals for Block 2 and Block 3 of GRFT,
for Total Group (N=46)

	1	2	3	4	5	6	7	8	9	10	11
Block 2											
1. Trial 1		.58**	.71**	.67**	.82**	.47**	.58**	.59**	.64**	.66**	.71**
2. Trial 2			.54**	.91**	.90**	.43**	.93**	.47**	.87**	.79**	.88**
3. Trial 3				.69**	.80**	.61**	.45**	.83**	.62**	.73**	.67**
4. Trial 4					.95**	.66**	.88**	.61**	.94**	.92**	.93**
5. Total						.61**	.85**	.69**	.90**	.90**	.93**
Block 3											
6. Trial 1							.36*	.75**	.66**	.86**	.69**
7. Trial 2								.38**	.82**	.75**	.84**
8. Trial 3									.55**	.79**	.66**
9. Trial 4										.91**	.92**
10. Total											.92**
11. Block 2 & 3 Total											

*$p < .05$; **$p < .01$.

Table 6

Product-Moment of Correlation Coefficients
between Trials and Totals for Block 2 and Block 3 of GRFT
for Girls (N=23) and Boys (N=23)

Girls (lower triangle)									Boys (upper triangle)		
	1	2	3	4	5	6	7	8	9	10	11
Block 2											
1. Trial 1		.67**	.73**	.79**	.90**	.64**	.61**	.46*	.71**	.78**	.87**
2. Trial 2	.52**		.82**	.89**	.92**	.60**	.63**	.40*	.86**	.78**	.89**
3. Trial 3	.66**	.41*		.72**	.90**	.77**	.39	.67**	.72**	.82**	.89**
4. Trial 4	.62**	.89**	.64**		.93**	.52**	.72**	.35	.87**	.76**	.89**
5. Total	.78**	.89**	.74**	.96**		.70**	.65**	.52**	.86**	.87**	.97**
Block 3											
6. Trial 1	.40*	.33	.55**	.63**	.55**		.24	.80**	.47*	.82**	.78**
7. Trial 2	.54**	.98**	.41*	.90**	.89**	.31		.05	.70**	.61**	.65**
8. Trial 3	.60**	.42*	.87**	.63**	.70**	.75**	.42**		.29	.76**	.65**
9. Trial 4	.59**	.85**	.55**	.95**	.90**	.66**	.83**	.58**		.78**	.85**
10. Total	.62**	.76**	.68**	.93**	.89**	.85**	.75**	.80**	.92**		.96**
11. Block 2 & 3 Total	.66**	.85**	.58**	.92**	.91**	.63**	.86**	.64**	.92**	.91**	

*$p<.05$; **$p<.01$.

To determine relationships of inter-trial performance on the GRFT, Product-moment coefficients of correlation were computed. Nearly all values of r reached the .01 significance level for the total sample (Table 5), and for girls and boys (Table 6), indicating internal consistency of GRFT variables.

In sum, analyses of GRFT performance revealed: (a) significant sex differences with boys demonstrating smaller deviations from vertical than girls; (b) no significant differences in performance across blocks by either group; (c) no significant differences within blocks for either sex, indicating settings of trials did not affect performance of either group.

Banta Embedded Figures Test (EFT) Performance

The EFT contained 14 stimulus trials, each with one figure to be disembedded. Total score was the number of trials correct. Number of seconds taken on each trial to disembed was recorded. Frequency and type of unsolicited verbal responses were tabulated and assigned numerical weightings: (a) social responses - 4 points each; (b) task information - 3 points apiece; (c) declarative statements - 2 points each; (d) ego responses - 1 point apiece. Table 7 contains EFT summarizing data for the total sample and for sex groups separately. t tests of differences between sexes on total number correct responses, response time, and total unweighted and weighted verbal responses were not significant.

Analyses of variance comparing Sex X Type of Verbal Response on the EFT were computed for unweighted and weighted scores (Table 8). No significant sex differences in type of verbal response were found. Significant differences ($p < .01$) between types of verbal responses for both sexes were found, however. Frequency and type of unweighted and weighted

Table 7

EFT Means and Standard Deviations
for Total Group (N=46), Girls (N=23), and Boys (N=23)
with Comparisons between Girls and Boys

Scores	Total Group		Girls		Boys		
	M	SD	M	SD	M	SD	t
Total Right	11.65	1.16	11.83	0.98	11.48	1.31	1.02
Total Time	99.22	50.11	92.48	40.83	105.96	58.08	0.91
Total Unweighted Verbal Responses	3.70	6.12	4.70	7.63	2.70	4.05	1.11
Total Weighted Verbal Responses	10.20	16.78	13.00	21.21	7.39	10.48	1.14

Table 8

Analyses of Variance for Girls' and Boys'
Unweighted and Weighted Verbal Responses on the EFT

Source	df	MS	F
Between Subjects			
Sex	1	11.50	1.23
Error	44	9.33	
Within Subjects			
Unweighted Verbal Responses	3	16.79	5.53**
Sex x Unweighted Verbal Responses	3	5.17	1.70
Error	132	3.04	
Between Subjects			
Sex	1	96.14	1.37
Error	44	70.12	
Within Subjects			
Weighted Verbal Responses	3	234.02	8.89**
Sex x Weighted Verbal Responses	3	51.54	1.96
Error	132	26.31	

**$p < .01$

Table 9

EFT Means and Standard Deviations

of Unweighted and Weighted Verbal Responses

for Total Group (N=46), Girls (N=23), and Boys (N=23)

	Total Group		Girls		Boys	
Scores	M	SD	M	SD	M	SD
Unweighted						
Social Responses	1.39	2.45	1.87	3.15	0.91	1.38
Task Information	0.41	1.67	0.30	0.76	0.52	1.47
Declarative Statements	1.50	3.22	2.09	3.94	0.91	2.21
Ego Responses	0.39	0.95	0.48	1.08	0.35	0.88
Total Unweighted	3.70	6.12	4.70	7.63	2.70	4.05
Weighted						
Social Responses	5.50	9.84	7.48	12.61	3.52	5.54
Task Information	1.24	3.50	0.91	2.29	1.57	4.42
Declarative Statements	2.98	6.44	4.17	7.88	1.78	4.43
Ego Responses	0.39	0.95	0.43	1.04	0.35	0.88
Total Weighted	10.20	16.78	13.00	21.21	7.39	10.48

verbal responses were examined for differences within and between the total sample and sex groups separately. Means and standard deviations according to response category are reported in Table 9.

In that differences between boys and girls performance were not statistically significant, data were pooled for post hoc tests. Based on means of unweighted verbal scores, correlated *t* tests revealed task information and ego responses differed significantly from social responses at the .01 level, and from declarative statements at the .05 level. Similar analyses of weighted scores revealed social responses differed significantly from task information and ego responses at the .01 level.

Product-moment coefficients of correlation were computed to determine relationships between EFT scores for the total sample (Table 10), and for sex groups separately (Table 11). For the majority of relationships, Pearson *r* values were significant beyond the .01 level. For the total sample, number of correct responses correlated only with social responses ($r=.33$, $p<.05$); no other significant relationships were found between total number correct responses or response time (Table 10).

For girls, total number correct responses correlated significantly with social ($r=.41$) and total verbal ($r=.42$) responses; response time correlated significantly with all verbal measures, save ego responses (Table 11). Of particular interest was the finding that there were no significant relationships between total number correct responses or response time and any of the verbal variables for boys (Table 11). Most verbal response variables intercorrelated significantly for all groups.

In sum, analyses of EFT performance revealed: (a) no significant sex differences in total number correct responses, response time, or verbal responsiveness; (b) significant differences between types of

Table 10

Product-Moment Coefficients of Correlation between EFT Variables for Total Group (N=40)

		1	2	3	4	5	6	7	8	9	10	11	12
1.	Total Right		-.17	.33*	.03	.25	.19	.30	.33*	.03	.25	.19	.31
2.	Total Time			.24	.19	.20	.15	.26	.24	.19	.20	.15	.26
3.	Social Responses				.43**	.59**	.34*	.85**	1.00**	.43**	.59**	.34*	.92**
4.	Task Information					.29*	.15	.54**	.43**	1.00**	.29*	.15	.58**
5.	Declarative Statements						.48**	.89**	.59**	.29	1.00**	.48**	.82**
6.	Ego Responses							.57**	.34*	.15	.48**	1.00**	.47**
7.	Total Unweighted								.85**	.54**	.89**	.57**	.98**
8.	Social Responses									.43**	.60**	.34*	.92**
9.	Task Information										.29	.15	.58**
10.	Declarative Statements											.48**	.82**
11.	Ego Responses												.47**
12.	Total Weighted												

*p<.05; **p<.01.

Table 11

Product-Moment Coefficients of Correlation

between EFT Variables for Girls (N=23) and Boys (N=23)

Girls (lower triangle)											Boys (upper triangle)		
		1	2	3	4	5	6	7	8	9	10	11	12
1.	Total Right		-.25	.24	-.04	.16	.09	.17	.24	-.04	.15	.09	.19
2.	Total Time	.02		-.29	.02	-.16	-.02	-.18	-.27	.02	-.16	-.02	-.21
3.	Social Responses	.42*	.70**		.45*	.24	.06	.65**	.99**	.45*	.23	.06	.82**
4.	Task Information	.25	.62**	.71**		.04	.03	.50*	.46*	1.00**	-.04	.03	.64**
5.	Declarative Statements	.32	.58**	.67**	.82**		.87**	.80**	.23	-.04	1.00**	.87**	.60**
6.	Ego Responses	.34	.34	.50*	.37	.28		.73**	.07	.03	.87**	1.00**	.50*
7.	Total Unweighted	.41*	.70**	.90**	.87**	.91**	.53**		.65**	.50*	.80**	.73**	.95**
8.	Social Responses	.42*	.70**	1.00**	.71**	.67**	.50*	.90**		.46*	.24	.07	.82**
9.	Task Information	.25	.62**	.71**	1.00**	.82**	.37	.87**	.72**		-.04	.03	.64**
10.	Declarative Statements	.32	.58**	.67**	.82**	1.00**	.28	.91**	.67**	.82**		.88**	.60**
11.	Ego Responses	.30	.38	.46*	.40*	.30	.98**	.52**	.46*	.40*	.30		.50*
12.	Total Weighted	.41*	.72**	.94**	.86**	.87**	.49*	.99**	.94**	.86**	.87**	.48*	

*p<.05; **p<.01.

verbal responses with social responses and declarative statements most frequent, and task information and ego responses less frequent; (c) significant relationships between total number correct responses and response time to the majority of verbal variables for girls, but not for boys.

Banta Matching Familiar Figures Test (MFF) Performance

The MFF contained 12 stimuli sets, each with a standard figure to be matched to one of several variants. Half the sets were social in content; half were non-social. Total score was the number of correct matches; correct responses on social and non-social sets were tabulated separately to allow consideration of a social-independence-dependence score. Number of seconds taken on each trial to match was recorded. Frequency and type of unsolicited verbal response were tabulated and assigned numerical weightings as for the Embedded Figures Test. Table 12 contains MFF summarizing data for the total sample and for sex groups separately. t tests revealed that differences between sex groups on total number of correct responses and response time were not significant. However, t comparisons of boys and girls scores according to unweighted and weighted verbal responses were significant (t=2.44; 2.59, $p<.01$). Examination of mean scores in Table 12 reveals that girls made more verbal responses than did boys.

Means and standard deviations of social-independence-dependence scores are reported in Table 13 for the total sample and for sex groups separately.

Table 12

MFF Means and Standard Deviations

for Total Group (N=46), Girls (N=23), and Boys (N=23),

with Comparisons between Girls and Boys

	Total Group		Girls		Boys		
Scores	M	SD	M	SD	M	SD	t
Total Right	6.83	1.78	7.09	1.47	6.57	2.04	0.99
Total Time	71.33	35.10	69.52	20.62	73.13	45.69	0.35
Total Unweighted Verbal Responses	2.22	3.94	3.57	4.77	0.87	2.30	2.44**
Total Weighted Verbal Responses	4.80	8.64	7.91	10.59	1.70	4.52	2.59**

**$p < .01$.

Table 13

MFF Means and Standard Deviations
of Social-Independence-Dependence Scores
for Total Group (N=46), Girls (N=23), and Boys (N=23)

	Total Group		Girls		Boys	
	M	SD	M	SD	M	SD
Social-Independence	3.09	1.03	3.30	0.82	2.87	1.18
Social-Dependence	3.78	1.19	3.87	1.22	3.70	1.18

A 2 X 2 analysis of variance was computed to compare Sex X Type of Social Response (Table 14). Main effect of sex was not significant, but a significant difference between social-independence and social-dependence scores for both sexes at the .01 level (F=12.41) was found.

Table 14

Analysis of Variance for Girls' and Boys'
MFF Social-Independence and Social-Dependence Scores

Source	df	MS	F
Between Subjects			
Sex	1	2.13	1.35
Error	44	1.58	
Within Subjects			
SI/SD Responses	1	11.13	12.41**
Sex x SI/SD Responses	1	0.39	0.44
Error	44	.90	

**$p < .01$.

Frequency and type of unweighted and weighted verbal responses were examined for differences within and between the total sample and sex groups separately. Means and standard deviations according to response category are reported in Table 15.

Table 15

MFF Means and Standard Deviations

for Total Group (N=46), Girls (N=23), and Boys (N=23),

with Comparisons between Girls and Boys

	Total Group		Girls		Boys	
Scores	M	SD	M	SD	M	SD
Unweighted						
Social Responses	0.24	0.82	0.43	1.12	0.04	0.21
Task Information	0.15	0.56	0.30	0.76	0.00	0.00
Declarative Statements	1.70	3.40	2.70	4.19	0.70	2.01
Ego Responses	0.13	0.34	0.13	0.34	0.13	0.34
Total Unweighted	2.22	3.94	3.57	4.77	0.87	2.30
Weighted						
Social Responses	0.96	3.29	1.74	4.48	0.17	0.83
Task Information	0.33	1.14	0.65	1.56	0.00	0.00
Declarative Statements	3.39	6.81	5.39	8.39	1.39	4.02
Ego Responses	0.13	0.34	0.13	0.34	0.13	0.34
Total Weighted	4.80	8.64	7.91	10.59	1.70	4.52

Analyses of variance comparing Sex X Type of Verbal Response on the MFF were computed for unweighted and weighted scores (Table 16). Sex differences and interaction between sex and verbal response type were significant at the .05 level. Differences between types of verbal responses were also significant ($p < .01$) for both sexes. Examination of patterns of scores for boys and girls revealed that girls made consistently more verbal responses than did boys. t tests of differences between verbal response modes for boys and girls revealed girls made significantly more declarative statements than did boys ($p < .05$).

Table 16

Analyses of Variance for Girls' and Boys'
Unweighted and Weighted Verbal Responses on the MFF

Source	df	MS	F
Between Subjects			
Sex	1	20.89	5.97*
Error	44	3.50	
Within Subjects			
Unweighted Verbal Responses	3	26.73	9.58**
Sex x Unweighted Verbal Responses	3	9.31	3.34*
Error	132	2.79	
Between Subjects			
Sex	1	111.14	6.71*
Error	44	16.56	
Within Subjects			
Weighted Verbal Responses	3	103.79	8.10**
Sex x Weighted Verbal Responses	3	35.31	2.76*
Error	132	12.81	

*$p < .05$; **$p < .01$.

Product-moment coefficients of correlation were computed to examine relationships between MFF scores for the total sample (Table 17), and for

Table 17
Product-Moment Coefficients of Correlation
between MFF Variables for Total Group (N=46)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Total Right		.41**	.79**	.80**	.26	.07	.08	.15	.14	.26	.29	.08	.15	.17
2.	Total Time			.15	.50**	.14	.11	.10	-.02	-.12	.14	.03	.10	-.02	.13
3.	Social Dependence				.29	.24	-.05	.14	.07	.17	.24	.00	.14	.07	.20
4.	Social Independence					.16	.17	.11	.16	.17	.16	.03	.11	.16	.16
5.	Social Responses	.55**	.18	-.03	.44**	1.00**	.56**	.18	-.03	.59**					
6.	Task Information		.20	-.11	.42**	.55**	.87**	.20	-.10	.48**					
7.	Declarative Statements			.28	.95**	.18	.18	1.00**	.28	.89**					
8.	Ego Responses				.31	-.03	-.11	.28	1.00**	.24					
9.	Total Unweighted					.44**	.39**	.95**	.31	.98**					
10.	Social Responses						.56**	.18	-.03	.59**					
11.	Task Information							.18	-.11	.48**					
12.	Declarative Statements								.28	.89**					
13.	Ego Responses									.24					
14.	Total Weighted														

*p<.05; **p<.01.

Table 18
Product-Moment Coefficients of Correlation
between MFF Variables for Girls (N=23) and Boys (N=23)

Girls (lower triangle)												Boys (upper triangle)			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Total Right		.54**	.86**	.86**	.37	-	.35	.15	.36	.37	-	.35	.15	.39
2.	Total Time	.10		.35	.58**	.84**	-	.24	.01	.29	.83**	-	.24	.01	.37
3.	Social Dependence	.72**	-.25		.49*	.24	-	.09	-.01	.10	.24	-	.09	-.01	.13
4.	Social Independence	.65**	.40*	-.00		.39	-	.52**	.27	.53**	.39	-	.52**	.27	.56**
5.	Social Responses	.31	.04	.28	.10		-	.25	-.08	.30	1.00	-	.25	-.08	.40*
6.	Task Information	.06	.31	-.10	.21	.53**		-	-	-	-	-	-	-	-
7.	Declarative Statements	-.16	.05	.14	-.26	.11	.14		.65**	.99**	.25	-	1.00**	.65**	.99**
8.	Ego Responses	.16	-.09	.15	.01	-.04	-.16	.15		.71**	-.08	-	.65**	1.00**	.64**
9.	Total Unweighted	-.05	.10	.19	-.17	.41	.40	.94**	.17		.30	-	.99**	.71**	.99**
10.	Social Responses	.31	.04	.28	.10	1.00**	.53**	.11	-.04	.41*		-	.25	-.08	.40*
11.	Task Information	-.03	.12	-.03	-.06	.53**	.86**	.12	.17	.35	.53*		-	-	-
12.	Declarative Statements	-.16	.05	.14	-.26	.11	.14	1.00**	.15	.93**	.11	.12		.65**	.99**
13.	Ego Responses	.16	-.09	.15	.01	-.04	-.16	.15	1.00**	.17	-.04	-.17	.15		.64**
14.	Total Weighted	.00	.08	.23	-.17	.59**	.46*	.86**	.11	.98**	.59**	.46*	.86**	.12	

*p<.05; **p<.01.

sex groups separately (Table 18). Total number correct responses correlated significantly ($p<.01$) with response time and scores of social and non-social content for the total group and for boys, but only with social and non-social content scores for girls. That is, girls total number correct responses were independent of response time. Response time correlated only with scores of non-social content for the total group ($r=.50$, $p<.01$), and for girls ($r=.40$, $p<.05$). Correlations at the .01 level were found between response time, scores of non-social content ($r=.58$), and verbal social responses ($r=.84$, $r=.83$) for boys. Approximately one half of the Pearson r values were at the .05 or .01 significance level among verbal response variables, particularly total weighted verbal responses, for all groups. In that none of the boys made task information responses, this variable was not correlatable as indicated in Table 18.

In sum, analyses of MFF performance revealed: (a) no significant sex differences in total number correct responses or response time; (b) a significant difference between scores of social and non-social content for both sexes; (c) significant sex differences and interaction between sex and verbal response type, with girls making significantly more declarative statements than boys; (d) significant correlations between total number correct and response time for boys, but not for girls.

Harris' Draw-A-Person Test (DAP) Performance

In the DAP, subjects were required to draw a whole person of either sex. Drawings were scored for intellectual maturity according to Harris' (1963) scales, and for Articulation-of-Body-Concept by Witkin's (1970) criteria. Frequency and type of unsolicited verbal responses were

tabulated and assigned numerical weightings as for Embedded Figures and Matching Familiar Figures Tests. Table 19 contains DAP summarizing data for the total sample and for sex groups separately. *t* tests revealed that differences between sexes on scores of intellectual maturity, body articulation, and total unweighted and weighted verbal responses were not significant.

Table 19

DAP Means and Standard Deviations
for Total Group (N=46), Girls (N=23), and Boys (N-23)
with Comparisons between Girls and Boys

	Total Group		Girls		Boys		
Scores	M	SD	M	SD	M	SD	*t*
Harris Score	106.61	16.69	109.28	17.01	104.00	16.32	1.06
ABC Score	3.39	1.11	3.61	1.08	3.17	1.11	1.35
Total Unweighted Verbal Responses	0.96	1.66	1.30	1.96	0.61	1.23	1.44
Total Weighted Verbal Responses	2.20	4.22	2.91	5.26	1.48	2.76	1.16

Frequency and type of unweighted and weighted verbal responses were examined for differences within and between the total sample and sex groups separately. Means and standard deviations according to response category are reported in Table 20. Examination of mean values indicates that, overall, girls made more verbal responses than did boys, particularly weighted social responses. However, analyses of variance comparing Sex X Type of Verbal Response on the DAP calculated for unweighted and weighted scores (Table 21) revealed no significant sex differences in relation to type of verbal response. Main effect of type of weighted verbal responses was significant ($p<.05$).

Table 20

DAP Means and Standard Deviations

of Unweighted and Weighted Verbal Responses

for Total Group (N=43), Girls (N=23), and Boys (N=23)

	Total Group		Girls		Boys	
Scores	M	SD	M	SD	M	SD
Unweighted						
Social Responses	0.26	0.74	0.39	0.94	0.13	0.46
Task Information	0.04	0.21	0.04	0.21	0.04	0.21
Declarative Statements	0.35	0.71	0.35	0.35	0.35	0.71
Ego Responses	0.33	0.90	0.52	1.16	0.13	0.46
Total Unweighted	0.96	1.66	1.30	1.96	0.61	1.23
Weighted						
Social Responses	1.04	2.97	1.57	3.76	0.52	1.83
Task Information	0.13	0.62	0.13	0.63	0.13	0.63
Declarative Statements	0.70	1.41	0.70	1.43	0.70	1.43
Ego Responses	0.33	0.90	0.52	1.16	0.13	0.46
Total Weighted	2.20	4.22	2.91	5.26	1.48	2.76

Table 21

Analyses of Variance for Girls' and Boys'
Unweighted and Weighted Verbal Responses on the DAP

Source	df	MS	F
Between Subjects			
Sex	1	1.22	1.82
Error	44	.67	
Within Subjects			
Unweighted Verbal Responses	3	.89	2.20
Sex x Unweighted Verbal Responses	3	.44	1.09
Error	132	.40	
Between Subjects			
Sex	1	5.92	1.34
Error	44	4.42	
Within Subjects			
Weighted Verbal Responses	3	7.53	3.00*
Sex x Weighted Verbal Responses	3	2.79	1.11
Error	132	2.52	

*$p < .05$.

Product-moment coefficients of correlation were computed to investigate relationships between DAP scores for the total sample (Table 22), and for sex groups separately (Tables 23). Intellectual maturity scores correlated significantly ($p < .01$) with body articulation scores for all groups. Correlations between types of verbal responses and intellectual maturity were significant for: (a) social responses in the total sample; (b) task information among girls; (c) declarative statements, ego responses, and total verbal responses among boys. Nearly half the Pearson r values were at the .01 significance level among verbal response variables for all groups.

Table 22
Product-Moment Coefficients of Correlation
between DAP Variables for Total Group (N=46)

		1	2	3	4	5	6	7	8	9	10	11	12
1.	Harris Score		.65**	-.03	-.26	.29*	.15	.15	-.03	-.26	.29*	.15	.07
2.	ABC Score			-.13	-.27	.25	.50**	.28	-.13	-.27	.25	.50**	.06
3.	Social Responses	.50**	.37**	.00		.68**	1.00**	.50**	.37**	.00			.90**
4.	Task Information		.20	-.08	.40**	.50**	1.00**	.20	-.08				.55**
5.	Declarative Statements			.20	.73**	.37	.20	1.00**	.20				.67**
6.	Ego Responses				.61**	.00	-.08	.20	1.00**				.28
7.	Total Unweighted					.68**	.40**	.73**	.61**				.91**
8.	Social Responses						.50**	.37**	.00				.90**
9.	Task Information							.20	-.08				.55**
10.	Declarative Statements								.20				.67**
11.	Ego Responses												.27
12.	Total Weighted												

*p<.05; **p<.01.

Table 23
Product-Moment Coefficients of Correlation
between DAP Variables for Girls (N=23) and Boys (N=23)

Girls (lower triangle)											Boys (upper triangle)		
		1	2	3	4	5	6	7	8	9	10	11	12
1.	Harris Score		.69**	.22	-.12	.55**	.51*	.59**	.22	-.12	.55**	.51*	.49*
2.	ABC Score	.59**		.13	-.03	.43*	.40*	.42*	.13	-.03	.43*	.40*	.37
3.	Social Responses	-.20	-.34		-.06	.13	-.08	.42*	1.00**	-.06	.13	-.08	.70**
4.	Task Information	-.40*	-.53**	.84**		.20	-.06	.25	-.06	1.00**	.20	-.06	.28
5.	Declarative Statements	.03	.07	.53**	.20		.69**	.94**	.13	.20	1.00**	.69**	.76**
6.	Ego Responses	-.01	.57**	-.03	-.10	.05		.67**	-.08	-.06	.69**	1.00**	.45*
7.	Total Unweighted	-.13	.14	.74**	.52**	.67**	.58**		.42*	.25	.94**	.66**	.92**
8.	Social Responses	-.20	-.34	1.00**	.84**	.53**	.03	.74**		.06	.13	-.08	.70**
9.	Task Information	-.40*	-.53**	.84**	1.00**	.20	-.10	.52**	.84**		.20	-.06	.28
10.	Declarative Statements	.03	.07	.53**	.20	1.00**	.05	.67**	.53**	.20		.69**	.76**
11.	Ego Responses	-.01	.57**	-.03	-.10	.05	1.00**	.58**	-.03	-.10	.05		.45*
12.	Total Weighted	-.18	-.16	.95**	.75**	.69**	.20	.90**	.95**	.75**	.69**	.20	

*$p<.05$; **$p<.01$.

In sum, analyses of DAP performance revealed: (a) no significant sex differences on scores of intellectual maturity, body articulation, or verbal responsiveness; (b) significant differences between types of weighted verbal responses for both sexes, with social responses the most favored, and task information responses least favored; (c) significant correlations between analyses of intellectual maturity and body articulation for all groups.

Relationships of Performance on GRFT, EFT, MFF, and DAP

Relationships between all measures were computed with Product-moment coefficients of correlation. Summarizing data are reported in Table 24 for the total sample. No relationship was found between GRFT scores and any other variable. EFT total number correct responses related significantly only with EFT verbal responsiveness. MFF total number correct responses correlated significantly with MFF response time and scores of social and non-social content, and with DAP intellectual maturity and body articulation scores. Values of r for MFF response time in relation to EFT response time and MFF non-social content score were significant. Body articulation score correlated significantly with intellectual maturity score, MFF social and non-social content scores, and MFF verbal responsiveness. Total unweighted and weighted verbal responses within and between all measures correlated at the .05 and .01 significance levels.

Product-moment coefficients of correlation for girls are reported in Table 25. GRFT scores did not correlate with any variable, save negatively with DAP total unweighted verbal responses. EFT total number correct responses and response time related significantly to EFT verbal responsiveness, but not to teach other. MFF total number correct

responses correlated with MFF scores of social and non-social content, and DAP body articulation. MFF response time correlated significantly only with MFF non-social content scores. DAP intellectual maturity and body articulation scores were highly related. Total unweighted and weighted verbal responses within each measure correlated significantly, but few significant relationships across verbal measures were found. Overall, for girls, few relationships between variables reached statistical significance.

Product-moment correlation coefficients for boys, reported in Table 25, show that GRFT scores did not correlate significantly with any variable, save negatively (as predicted) with EFT total number correct responses. Pearson r between EFT and MFF response times reached statistical significance. In general, MFF variables of total number correct responses, response time, and scores of social and non-social content were significantly related. Non-social content score also correlated significantly with MFF and DAP total verbal responses. Values of r for DAP intellectual maturity in relation to body articulation and all verbal response totals were significant. Total unweighted and weighted verbal responses within and between all measures correlated at the .05 and .01 significance levels.

In sum, performance on the GRFT was, for the most part, unrelated to EFT, MFF, and DAP performance, and to the majority of verbal scores. EFT total number correct responses and GRFT total were significantly related for boys, but not for girls. Overall, verbal responses related across tasks, the pattern being considerably more consistent for boys than for girls. In general, more interrelationships among variables were found for boys than for girls.

Table 24
Product-Moment Coefficients of Correlation
between Variables of the GRFT, EFT, MFF, and DAP for Total Group (N=46)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	GRFT Total Score		-.11	-.18	-.20	-.19	.07	-.09	.08	.06	-.12	-.14	-.04	.04	-.24	-.22
2.	EFT Total Right			-.17	.30*	.31*	.06	-.00	.06	.04	-.11	.14	.01	.23	.05	-.09
3.	EFT Total Time				.26	.26	.13	.41**	.13	.03	-.04	.05	-.11	-.15	.05	.10
4.	EFT Unweighted Verbal Responses					.98**	.21	.02	.09	.23	.39**	.48**	.18	.22	.47**	.38**
5.	EFT Weighted Verbal Responses						.19	-.00	.10	.18	.33*	.44**	.18	.23	.42**	.34*
6.	MFF Total Right							.41**	.79**	.80**	.14	.17	.36*	.41**	.09	-.01
7.	MFF Total Time								.15	.50**	.12	.13	-.04	-.00	.20	.21
8.	MFF Social Dependency									.29*	.17	.20	.24	.34*	-.14	-.23
9.	MFF Social Independency										.17	.16	.28	.30*	.29*	.23
10.	MFF Unweighted Verbal Responses											.98**	.15	.32*	.40**	.29*
11.	MFF Weighted Verbal Responses												.16	.33*	.41**	.30*
12.	DAP Harris Score													.65**	.15	.07
13.	DAP ABC Score														.28	.06
14.	DAP Unweighted Verbal Responses															.91**
15.	DAP Weighted Verbal Responses															

*$p<.05$; **$p<.01$.

Table 25
Product-Moment Coefficients of Correlation
between Variables of the GRFT, EFT, MFF, and DAP for Girls (N=23) and Boys (N=23) .

Girls (lower triangle)															Boys (upper triangle)	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	GRFT Total Score		-.40*	-.10	.04	.09	.13	-.01	.21	.02	.00	-.02	-.05	-.11	-.13	-.17
2.	EFT Total Right	-.12		-.25	.17	.19	-.00	.13	-.11	.10	.10	.13	.02	.13	.21	.21
3.	EFT Total Time	-.21	.02		-.18	-.21	.26	.58**	.31	.14	-.02	.02	-.15	-.15	-.15	-.14
4.	EFT Unweighted Verbal Responses	-.36	.41*	.70**		.95**	.18	-.03	.04	.27	.65**	.62**	.46*	.23	.68**	.56**
5.	EFT Weighted Verbal Responses	-.35	.41*	.72**	.99**		.10	-.08	-.01	.19	.49*	.46*	.41*	.23	.59**	.53**
6.	MFF Total Right	-.03	.10	-.06	.24	.25		.54**	.86**	.86**	.36	.39	.38	.37	.34	.31
7.	MFF Total Time	-.18	-.37	-.10	.13	.11	.10		.35	.58**	.29	.37	-.08	-.04	.18	.22
8.	MFF Social Dependency	.01	.25	-.09	.11	.14	.72**	.25		.49*	.10	.13	.39	.28	.13	.13
9.	MMF Social Independency	-.05	-.16	-.10	.19	.16	.65**	.40*	.00		.53**	.56**	.27	.36	.46*	.41*
10.	MFF Unweighted Verbal Responses	-.35	.06	.03	.28	.25	.05	.10	.19	.17		.99**	.48*	.36	.81**	.58**
11.	MFF Weighted Verbal Responses	-.37	.09	.19	.42*	.40*	.00	.08	.23	.17	.98**		.44*	.34	.82**	.59**
12.	DAP Harris Score	-.01	-.11	-.01	.01	.04	.31	.07	.08	.26	-.07	-.01		.69**	.59**	.49*
13.	DAP ABC Score	-.15	.32	-.10	.20	.21	.42*	.11	.38	.14	.25	.29	.59**		.42*	.37
14.	DAP Unweighted Verbal Responses	-.42*	-.14	.30	.38	.34	-.18	.37	-.34	.11	.22	.25	-.13	.14		.92**
15.	DAP Weighted Verbal Responses	-.34	-.37	.35	.30	.26	-.29	.36	-.46*	.09	.17	.18	-.18	-.16		.90**

*$p<.05$; **$p<.01$.

Field-Independence-Dependence (FID) Performance

In addition to analyses of performance according to total sample and sex groups, data were organized to determine whether the field-independence-dependence continuum could be identified in subjects of preschool age on these measures. FID was assessed by performance on the Gerard Rod and Frame Test (GRFT), Banta's Embedded Figures Test (EFT), and Harris' Draw-A-Person Test (DAP). Product-moment coefficients of correlation were computed to investigate relationships between FID scores on these measures for the total sample (Table 26), and for sex groups separately (Table 27). Intellectual maturity and body articulation assessed

Table 26

Product-Moment Coefficients of Correlation for Total Scores on the GRFT, EFT, and DAP for Total Group (N=46)

	1	2	3	4
1. GRFT Total Score		-.11	-.04	.04
2. EFT Total Right			.23	-.01
3. DAP Total ABC				.65**
4. DAP Total Harris				

**p<.01.

Table 27

Product-Moment Coefficients of Correlation for Total Scores on the GRFT, EFT, and DAP for Girls (N=23) and Boys (N=23)

Girls (lower triangle)			Boys (upper triangle)	
	1	2	3	4
1. GRFT Total Score		-.40*	-.11	-.05
2. EFT Total Right	-.12		.13	.02
3. DAP Total ABC	-.15	.32		.69**
4. DAP Total Harris	-.01	-.11	.59**	

*p<.05; **p<.01.

by the DAP correlated at the .01 significance level for the total sample (r=.65), and for both sexes (r=.59, r=.69). A significant negative correlation (r=-.40, p<.05) between GRFT performance and EFT total number correct responses was found for boys. No other relationships were significant among FID variables for all subject groupings.

Data were reorganized to identify subjects meeting Witkin's (1954, 1962, 1970) criteria of field-independence and field-dependence. Operationally, field-independent individuals were defined as those subjects with GRFT, EFT, and ABC scores below the median error scores; field-dependent subjects were those with scores above the median error scores. A frequency count by sex for field-independence and field-dependence on each measure is reported in Table 28.

Table 28

Number of Field-Independent and Field-Dependent Subjects on the GRFT, EFT, and DAP by Sex

	GRFT			EFT			DAP (ABC)	
	FI	FD		FI	FD		FI	FD
Girls N=23	9	14	Girls N=23	16	7	Girls N=23	11	12
Boys N=23	14	9	Boys N=23	15	8	Boys N=23	11	12
Total N	23	23	Total N	31	15	Total N	22	24

Only 4 girls and 5 boys met field-independence criteria across all three measures; three girls and one boy were consistently field-dependent across measures. Field-independence criteria on the GRFT and EFT were met by 3 girls and 5 boys; one boy was field-independent only on GRFT and ABC measures; five girls and 2 boys were field-independent on only the EFT and ABC. Field-dependence criteria on only the GRFT and EFT were

met by 2 girls and 3 boys; four girls and 3 boys were field-dependent on only the GRFT and ABC measures; two girls and 2 boys were field-dependent on only the EFT and ABC.

Reflectivity-Impulsivity (RI) Performance

Data were also organized to determine whether the reflectivity-impulsivity tempo could be identified in subjects of preschool age on these measures. RI was assessed by performance on Banta's Matching Familiar Figures Test (MFF). Product-moment coefficients of correlation were calculated to examine relationships between RI score components for the total sample and for sex groups separately. MFF response time correlated significantly with MFF total number correct responses for the total sample (r=.41), and for boys (r=.54); value of r for girls was .10, a non-significant relationship. No other relationships were significant among RI variables for subject groupings.

Data were reorganized to compare performance of subjects meeting Kagan's (1963, 1964) criteria of reflective and impulsive. Operationally, reflective individuals were defined as those subjects with MFF scores above the medians of total number correct responses and response time; impulsive subjects were those with scores below the medians of total number correct responses and response time. A frequency count by sex for reflectivity and impulsivity on the MFF is reported in Table 29.

Reflectivity criteria on the MFF were met by 9 girls and 7 boys; impulsivity criteria were met by 5 girls and 8 boys.

Table 29

Number of Reflective and Impulsive Subjects on the MFF by Sex

Total Correct	R	I
Girls N=23	16	7
Boys N=23	11	12
Total N	27	19

Response Time	R	I
Girls N=23	11	12
Boys N=23	11	12
Total N	22	24

Verbal Responsiveness (VR) Performance

In all measures save the GRFT, verbal-responsiveness was assessed in accordance with Kohlberg and Zigler's (1967) adaptation of Gewirtz's verbal dependency scale. During administration of the EFT, MFF, and DAP, frequency and type of unsolicited verbal responses made by the subject were recorded and assigned numerical weightings: (a) social responses - 4 points each; (b) task information - 3 points apiece; (c) declarative statements - 2 points each; (d) ego responses - 1 point apiece. Table 30 contains VR summarizing data across tasks for the total sample and for sex groups separately. Means and standard deviations for total unweighted and weighted verbal responses on the EFT, MFF, and DAP are reported. Examination of mean values reveals that verbal responses were most frequent in the EFT, least frequent in the DAP. Order of frequency was the same for each sex group.

Analyses of variance (2 X 3) were computed comparing Sex X Total Verbal Responses across Tasks for unweighted and weighted mean scores (Table 31). A significant main effect of task (EFT, MFF, DAP) total unweighted and weighted verbal responses was found for both sexes at the .01 level. Sex differences were in the expected direction and just

Table 30

VR Means and Standard Deviations

on the EFT, MFF, and DAP

for Total Group (N=46), Girls (N=23), and Boys (N=23)

	Total Group		Girls		Boys	
Scores	M	SD	M	SD	M	SD
Unweighted						
EFT	3.70	6.12	4.74	7.65	2.70	4.05
MFF	2.22	3.94	3.57	4.77	0.87	2.30
DAP	0.96	1.66	1.30	1.96	0.61	1.23
Weighted						
EFT	10.20	16.78	13.00	21.21	7.39	10.47
MFF	4.80	8.64	7.91	10.59	1.70	4.52
DAP	2.20	4.22	2.91	5.26	1.48	2.76

missed the .05 significance level. Interaction between sex and verbal response across tasks was not significant. Post hoc correlated t tests revealed DAP total verbal responses differed significantly from EFT and MFF total verbal responses at the .05 level. No significant differences were found between EFT and MFF total verbal responses.

Table 31

Analyses of Variance for Girls' and Boys'
Total Unweighted and Weighted Verbal Responses
across the EFT, MFF, and DAP

Source			
Between Subjects			
Sex	1	111.42	3.98
Error	2	86.46	
Within Subjects			
Unweighted Verbal Responses	2	86.46	6.65**
Sex x Unweighted Verbal Responses	2	11.85	0.91
Error	88	13.01	
Between Subjects			
Sex	1	674.09	3.76
Error	2	765.68	
Within Subjects			
Weighted Verbal Responses	2	765.68	8.30**
Sex x Weighted Verbal Responses	2	77.94	0.85
Error	88	92.20	

**$p < .01$.

Product-moment coefficients of correlation were calculated to investigate VR intra- and interrelationships among unweighted and weighted verbal responses for the total sample (Tables 32, 34), for girls and boys (Tables 33, 35). Nearly half the Pearson r values were at the .01 significance level among verbal response variables for the total

Table 32
Product-Moment Coefficients of Correlation
between Unweighted Verbal Responses
on the EFT, MFF, and DAP for Total Group (N=46)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	EFT Social Responses		.43**	.59**	.34**	.85**	.74**	.49**	-.05	.12	.19	.21	-.03	.07	.27	.28
2.	EFT Task Information			.29*	.15	.54**	.34*	.21	-.03	.09	.08	.10	.02	.12	.04	.12
3.	EFT Declarative Statements				.48**	.89**	.68**	.68**	.30*	.20	.51**	.21	.07	.58**	.37**	.56**
4.	EFT Ego Responses					.57**	.30*	.01	.10	.46**	.19	.13	.02	.26	.21	.29*
5.	EFT Total		.76**	.59**	.15	.24	.39**	.24	.03		.39**	.24	.03	.40**	.35*	.47**
6.	MFF Social Responses			.55**	.18	-.03	.44**	.15	.07		.16	.31*		.32*		
7.	MFF Task Information				.20	-.11	.42**	-.04	-.06		.20	.12		.13		
8.	MFF Declarative Statements					.28	.95**	.08	.02		.50**	.17		.35*		
9.	MFF Ego Responses						.31*	-.05	-.08		.27	.22		.21		
10.	MFF Total							.09	.02		.51**	.25		.40**		
11.	DAP Social Responses								.50**		.37**	.00		.68**		
12.	DAP Task Information										.20	-.08		.40**		
13.	DAP Declarative Statements											.20		.73**		
14.	DAP Ego Responses													.61**		
15.	DAP Total															

*p<.05; **p<.01.

Table 33
Product-Moment Coefficients of Correlation
between Unweighted Verbal Responses
on the EFT, MFF, and DAP for Girls (N=23) and Boys (N=23)

Girls (lower triangle)															Boys (upper triangle)	
		1	2	3	4	5	6	6	8	9	10	11	12	13	14	15
1.	EFT Social Responses		.45*	.24	.06	.65**	-.14	-	.10	.22	.11	.52**	-.14	.26	.09	.38
2.	EFT Task Information	.71**		-.04	.03	.50*	-.08	-	.07	.22	.09	.03	-.08	.08	-.11	.02
3.	EFT Declarative Statements	.67**	.82**		.87**	.80**	.01	-	.85**	.49*	.82**	.06	.01	.83**	.77**	.80**
4.	EFT Ego Responses	.50*	.37	.28		.73**	-.09	-	.65**	.44*	.63**	-.12	-.09	.59**	.56**	.51**
5.	EFT Total	.90**	.87**	.91**	.53**		-.09	-	.67**	.52**	.65**	.19	-.09	.70**	.54**	.68**
6.	MFF Social Responses	.81**	.85**	.77**	.38	.87**		-	.25	-.08	.30	-.06	1.00**	.20	-.06	.25
7.	MFF Task Information	.51*	.53**	.76**	-.02	.65**	.53**		-	-	-	-	-	-	-	-
8.	MFF Declarative Statements	-.16	-.07	.10	-.15	-.04	.11	.14		.65**	.99**	-.10	.25	.90**	.79**	.83**
9.	MFF Ego Responses	.10	-.16	.06	.56**	.13	-.04	-.16	.15		.71**	-.11	-.08	.55**	.46*	.45*
10.	MFF Total	.14	.21	.40*	-.00	.28	.41*	.40*	.94**	.17		-.11	.30	.89**	.75**	.81**
11.	DAP Social Responses	.11	.27	.22	.21	.22	.13	-.11	.05	-.02	.06		-.06	.13	-.08	.42*
12.	DAP Task Information	.01	.20	.11	.11	.09	-.08	-.09	-.09	-.08	-.12	.84**		.20	-.06	.25
13.	DAP Declarative Statements	.00	.21	.49*	-.05	.27	.20	.30	.39	-.01	.43*	.53**	.20		.69**	.94**
14.	DAP Ego Responses	.27	.22	.26	.15	.29	.31	.07	-.01	.16	.08	-.03	-.10	.05		.67**
15.	DAP Total	.21	.36	.45*	.19	.38	.31	.09	.15	.07	.22	.74**	.52**	.67**	.58**	

*p<.05; **p<.01.

Table 34
Product-Moment Coefficients of Correlation
between Weighted Verbal Responses
on the EFT, MFF, and DAP for Total Group (N=46)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	EFT Social Responses		.43**	.60**	.34*	.92**	.73**	.55**	-.05	.13	.32	.21	-.03	.08	.28	.23
2.	EFT Task Information			.29*	.15	.58**	.34**	.15	-.03	.09	.13	.10	.02	.12	.04	.12
3.	EFT Declarative Statements				.48**	.82**	.68**	.47**	.30*	.20	.56**	.21	.07	.58**	.38**	.43**
4.	EFT Ego Responses					.47**	.30*	.06	.10	.46**	.22	.13	.02	.26	.21	.23
5.	EFT Total		.78**	.53**	.08	.19	.44**	.23	.01	.30*	.32*	.34*				
6.	MFF Social Responses			.56**	.18	-.03	.59**	.15	.07	.16	.31*	.24				
7.	MFF Task Information				.18	-.11	.48**	-.02	-.06	.02	.09	.00				
8.	MFF Declarative Statements					.28	.89**	.08	.02	.50**	.17	.26				
9.	MFF Ego Responses						.24	-.05	-.08	.27	.22	.09				
10.	MFF Total							.11	.03	.47**	.28	.30*				
11.	DAP Social Responses								.50**	.37**	.00	.90**				
12.	DAP Task Information									.20	-.08	.55**				
13.	DAP Declarative Statements										.20	.67**				
14.	DAP Ego Responses											.27				
15.	DAP Total															

*p<.05; **p<.01.

Table 35
Product-Moment Coefficients of Correlation
between Weighted Verbal Responses
on the EFT, MFF, and DAP for Girls (N=23) and Boys (N=23)

Girls (lower triangle)																Boys (upper triangle)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	EFT Social Responses		.46*	.24	.07	.82**	-.14	-	.11	.22	.09	.53**	-.14	.27	.10	.48*
2.	EFT Task Information	.72**		-.04	.03	.64**	-.08	-	.07	.22	.07	.03	-.08	.08	-.11	.03
3.	EFT Declarative Statements	.67**	.82**		.88**	.60**	.01	-	.85**	.50*	.80**	.06	.01	.83**	.78**	.60**
4.	EFT Ego Responses	.46*	.40*	.30		.50*	-.09	-	.65**	.44*	.60**	-.12	-.09	.59**	.56**	.30
5.	EFT Total	94**	.86**	.87**	.48*		-.11	-	.50*	.45*	.46*	.30	-.11	.57**	.38	.53**
6.	MFF Social Responses	.81**	.85**	.77**	.42*	.88**		-	.25	-.08	.40*	-.06	1.00**	.20	-.06	.28
7.	MFF Task Information	.57**	.40*	.50*	.07	.57**	.53**		-	-	-	-	-	-	-	-
8.	MFF Declarative Statements	-.16	-.07	.10	-.14	-.07	.11	.12		.65**	.99**	-.10	.25	.90**	.79**	.58**
9.	MFF Ego Responses	.10	-.16	.06	.47*	.09	-.04	.17	.15		.64**	-.11	-.08	.55**	.46*	.27
10.	MFF Total	.30	.36	.49*	.09	.40*	.59**	.46*	.86**	.12		-.11	.40*	.88**	.72**	.59**
11.	DAP Social Responses	.11	.27	.22	.24	.19	.13	-.09	.05	-.02	.09		-.06	.13	-.08	.70**
12.	DAP Task Information	.01	.20	.11	.12	.07	-.08	-.09	-.09	-.08	-.12	.84**		.20	-.06	.28
13.	DAP Declarative Statements	.00	.21	.49*	-.03	.20	.20	.03	.39	-.01	.40*	.53**	.20		.69**	.76**
14.	DAP Ego Responses	.27	.22	.26	.10	.28	.31	.03	-.01	.16	.13	-.03	-.10	.05		.45*
15.	DAP Total	.14	.32	.36	.20	.26	.21	-.06	.13	.01	.18	.95**	.75**	.69**	.20	

*p<.05; **p<.01.

sample and for boys. Verbal variables within each task, but not across tasks, correlated significantly for girls. Results may be interpreted to suggest high consistency of verbal responsiveness within and across tasks for the total sample and for boys, but only within tasks for girls.

Data were reorganized to compare performance of subjects designated as verbal-independent and verbal-dependent on the basis of Gewirtz's criteria (Kohlberg & Zigler, 1967). For the purposes of this study, verbal-independent individuals were defined operationally as subjects with total unweighted verbal responses across the EFT, MFF, and DAP below the median of total unweighted verbal scores; verbal-dependent subjects were defined operationally as those with scores above the median of total unweighted verbal scores. A frequency count by sex for verbal-independence and verbal-dependence on each measure is reported in Table 36.

Table 36

Number of Verbal-Independent
and Verbal-Dependent Subjects
across the EFT, MFF, and DAP by Sex

	Verbal Independence	Verbal Dependence
Girls N=23	8	15
Boys N=23	14	9
Total N	22	24

Examination of cells revealed girls made more verbal responses than did boys, suggesting greater verbal-dependence of girls, and higher verbal-independence of boys.

Effects of Age

Although the age range of subjects (50-63 months) was narrow, these years are characterized by rapid developmental changes in a number of dimensions. Accordingly, Product-moment correlation coefficients were computed between age and performance on measures used in this study. Pearson r values and significance levels are reported in Table 37 for the total sample and for sex groups separately. For the total sample, age correlated significantly with EFT and MFF total number correct responses (r=.30, $p<.05$; r=.37, $p<.01$, respectively), and with MFF social and non-social content scores (r=.30, r=.32; $p<.05$). Among girls, only the Pearson r of 0.54 ($p<.01$) between age and EFT total number correct responses was significant. For boys, age correlated significantly with MFF total number correct (r=.44) and non-social content score (r=.48) at the .05 level.

Effects of Intellectual Maturity

Intellectual maturity as assessed by the Harris Draw-A-Person Test (DAP) was correlated with performance on measures used in this study by computing Product-moment correlation coefficients. Pearson r values and significance levels are reported in Table 38 for the total sample and for sex groups separately. For the total sample, intellectual maturity correlated significantly with MFF total number correct responses (r=.36, $p<.05$) and body articulation (r=.65, $p<.01$). Among girls, the Pearson r value of 0.59 ($p<.01$) between intellectual maturity and body articulation reached significance. For boys, intellectual maturity correlated significantly with EFT (r=.46), MFF (r=.48), and DAP (r=.55) total unweighted verbal responses, and with body articulation (r=.68, $p<.01$).

Table 37

Product-Moment Coefficients of Correlation
between CA and GRFT, EFT, MFF, and DAP Scores
for Total Group (N=46), Girls (N=23), and Boys (N=23)

Variables	Total Group r	Girls r	Boys r
CA & GRFT Score	0.06	0.04	0.30
CA & EFT Total Correct	0.30*	0.54**	0.12
CA & EFT Total Time	-0.08	-0.08	-0.10
CA & EFT Total Unweighted Verbal Responses	0.02	0.07	-0.05
CA & MFF Total Correct	0.37**	0.35	0.44*
CA & MFF Total Time	0.04	-0.37	0.25
CA & MFF Social Independence	0.30*	0.16	0.48*
CA & MFF Social Dependence	0.32*	0.37	0.27
CA & MFF Total Unweighted Verbal Responses	0.04	-0.03	0.18
CA & DAP Harris Score	-0.13	-0.24	0.03
CA & DAP ABC Score	0.24	0.26	0.27
CA & DAP Total Unweighted Verbal Responses	-0.16	-0.23	-0.02

*$p < .05$; **$p < .01$.

Table 38

between Intellectual Maturity and GRFT, EFT, MFF, and Dap Scores
for Total Group (N=46), Girls (N=23), and Boys (N=23)

Variables	Total Group r	Girls r
IM & GRFT Score	0.04	-0.01
IM & EFT Total Correct	-0.01	-0.11
IM & EFT Total Time	-0.11	-0.01
IM & EFT Total Unweighted Verbal Responses	0.18	0.01
IM & MFF Total Correct	0.36*	0.31
IM & MFF Total Time	-0.04	0.07
IM & MFF Social Independence	0.28	0.26
IM & MFF Social Dependence	0.24	0.08
IM & MFF Total Unweighted Verbal Responses	0.15	-0.07
IM & DAP ABC Score	0.65**	0.59*
IM & DAP Total Unweighted Verbal Responses	0.15	-0.13

*$p < .05$; **$p < .01$.

Summary of Results

Performance within and between the GRFT, EFT, MFF, and DAP was examined for the total sample and for sex groups separately. Patterns of field-independence-dependence, reflectivity-impulsivity, and verbal-independence-dependence were investigated. Effects of age and intellectual maturity were also considered.

Data analyses revealed significant sex differences only in GRFT performance and MFF verbal response mode. On the GRFT, boys demonstrated smaller deviations from vertical than girls, and were thus considered more field-independent. On MFF verbal responsiveness, girls made significantly more verbal comments, particularly declarative statements, than did boys. No significant sex differences were found between EFT, MFF, and DAP performance variables, save verbal response patterns. While girls made more responses within tasks, boys' responsiveness was more consistent across tasks.

Significant differences for both sexes were found between MFF social-independence and social-dependence scores, and between verbal response modes on the EFT, MFF, and DAP. Girls and boys scored higher on MFF social than non-social content stimuli, suggesting greater social-dependence for both groups. On EFT, MFF, and DAP verbal measures, social responses and declarative statements were significantly more frequent for both sexes.

Correlation analyses between measures yielded few significant relationships. The GRFT did not correlate with any variable, save negatively with EFT total number correct responses for boys, and DAP total unweighted verbal responses for girls. EFT and MFF response times correlated only for boys. Relationships between intellectual maturity

and body articulation scores were significant for both sexes, as were intercorrelations for all verbal variables.

Field-independence-dependence assessment on the GRFT, EFT, and DAP revealed intellectual maturity and body articulation scores intercorrelated for all groups. No other significant relationships were found, save a predicted negative one between GRFT scores and EFT total number correct responses for boys. Only 4 girls and 5 boys were field-independent across all measures; 3 girls and 1 boy were consistently field-dependent.

Reflectivity-impulsivity analyses of the MFF revealed that total number correct responses and response time correlated significantly for the total sample and for boys. Nine girls and 7 boys were reflective on the MFF; 5 girls and 8 boys were impulsive.

Correlation analyses computed between age, intellectual maturity, and performance on all measures yielded few significant relationships. Age correlated with EFT total number correct responses for the total sample and for girls, and with MFF total number correct responses and social-independence scores among boys and the total sample. Intellectual maturity and body articulation correlated significantly for all groups. Intellectual maturity also correlated with MFF total number correct responses for the total sample, and with all total unweighted verbal variables for boys.

CHAPTER IV

DISCUSSION

This study was designed to determine whether field-independence-dependence and reflectivity-impulsivity are identifiable in normal preschool children, and to assess whether sex differences and verbal responsiveness relate to field approach and conceptual style in this population. Data were analyzed to investigate possible sex differences in performance, to assess consistency of performance across measures, to determine relationships between measures, and to evaluate utility of the instruments for normal preschool children.

Consistent sex differences in field approach form a key tenet of Witkin's (et. al., 1962) global-analytic articulation construct, with males more field-independent than females. In the present study, performance of preschool children on Gerard's Rod and Frame apparatus demonstrated clearly that individual differences in field-independence-dependence were identifiable, and that boys were more field-independent than were girls. Girls's mean degrees error from vertical within and across tasks were not only significantly larger than boys', but also characterized by greater ranges. Thirty percent of girls' scores ranged up to twice as high as boys' largest scores. These results are similar to, but not as extreme as, Gerard Rod and Frame Test scores of 7 year old girls and boys reported by Roth (1970) who found that fifty percent of girls' scores ranged up to five times that of boys' greatest scores. However, score ranges of both sexes in the present study (girls: 0-203; boys: 0-119) were much greater than Roth's subjects (girls: 0-175; boys: 0-35) and available normative data (Witkin, 1967; Oltman, 1968).

Several possible explanations for these extreme score ranges may be suggested. Sex-associated score ranges cited by Witkin were based on Rod and Frame Test performance of children ages 8-13; those of Oltman were derived from college students' performance. Both the standard Rod and Frame Test and the Oltman apparati required subjects to state when the rod reached vertical, the investigator making the adjustments. In the present study, the apparatus required the subject to manipulate the rod himself. Possible effects of motoric, manipulative input from this task are unknown, but may have contributed to such large ranges of scores. Moreover, age of subjects used in this study may have been a factor in performance. It is of interest to note that although extreme, patterns of scores were consistent with established-field-independence-dependence sex differences. Inasmuch as the preschool years are characterized by immaturity of perceptual organization, and in view of the high response consistency within and between blocks for both sexes, support for age effect, rather than apparatus, seems reasonable.

In contrast to rod and frame settings, analyses of data from Banta's Embedded Figures and Matching Familiar Figures Tests revealed no significant differences in performance according to sex groups. The significant negative correlation between Gerard Rod and Frame Test and Embedded Figures Test scores predicted for both sexes in accordance with Witkin's theory was found only for boys. In addition, the significant positive correlation between total number correct responses and response time on the Matching Familiar Figures Test predicted for both sexes according to Kagan's hypothesis was found only for boys. Lack of sex differences in performance on the Embedded Figures and Matching Familiar Figures Tests,

and the discrepancy between sexes in strength of relationships between the Gerard Rod and Frame, Embedded Figures, and Matching Familiar Figures Tests may be interpreted in several ways.

During preschool and primary grade years, the Embedded Figures and Matching Familiar Figures Tests may not elicit differences in performance related to sex, a possibility suggested by absence of sex differences at this age on other paper and pencil perceptual discrimination tasks as reported by the Witkin group (Goodenough & Eagle, 1963; Karp & Konstadt, 1963) and independent researchers (Keogh, 1970a, 1970b; Reppucci, 1971; Roth,1970). That the sexes do not differ in disembedding skill before age 8 was suggested by Witkin and his associates (1962); Kagan and his colleagues (1964) reported absence of sex differences in MFF scores among several hundred children in grades one through four. On the basis of evidence in the present study, it is not possible to determine whether the lack of significant differences between performance of boys and girls is a function of the tests themselves, or whether there are, indeed, no differences for children of this age.

Task difficulty was suggested as the factor responsible for lack of sex differences in performance on the Children's Embedded Figures Test (CEFT) prior to age 8 (Karp & Konstadt, 1963; Roth, 1970; Watson, 1969). In the present study, however, absence of sex differences on the EFT may have been due to task ease. It was noted by this investigator that Banta's EFT appeared too easy for most subjects; mean scores of 11.83 and 11.48 for girls and boys respectively (possible range of 0-14), lend support to this observation. Banta's Embedded Figures Test was devised primarily for low SES, black children ages 3-6; subjects in the present

study were middle SES, white (save one Oriental) children ages 4-5. Mean scores suggest most children were able to perform so well on this version of the EFT that possible differences may have been obscured. On the other hand, test simplicity as an interpretation for failure of Banta's Matching Familiar Figures Test to elicit hypothesized sex differences may be rejected on the basis of mean scores for both sexes (boys: 6.57, girls: 7.09; score range 0-12). The MFF was a decidedly harder test for children of this age group, as reflected by their mean scores; however, no real differences in performance associated with sex were identified.

Immaturity of perceptual organization among young boys has also been proposed as explanative of lack of sex differences on perceptual discrimintion tasks (Karp & Konstadt, 1963; Roth, 1970). Extensive review of the research on sex differences in mental and behavioral traits compiled by Garai and Scheinfeld (1968) suggests that males are superior to females in visual orientation and spatial perception from infancy. Such research is not consistent with the hypothesized perceptual developmental lag among males, nor is the empirical evidence of males' superior rod and frame performance in the present study, and in those of Canavan (1969) and Roth (1970). Moreover, Witkins' contention that both the Rod and Frame and Embedded Figures Tests tap the same perceptual variable, i.e. ability to disembed, was found only for boys in the present study, a finding which may be interpreted as contradistinctive to notions of male perceptual immaturity.

The physical format of these measures may also provide an explanation for absence of sex differences on the Embedded Figures and Matching Familiar Figures Tests, and for differences in magnitude of relationships

between Gerard Rod and Frame Test and Embedded Figures Test performance of boys and girls. Disembedding on the Gerard Rod and Frame Test requires physical manipulation within a three-dimensional environment; the Embedded Figures Test and Matching Familiar Figures Test demand perceptual discrimination in a two-dimensional context. Since boys appear to possess higher activity levels than girls (Garai & Scheinfeld, 1968) manifested in more active interaction with the environment, it is feasible to suggest that boys may acquire a larger fund of experiential knowledge facilitating and/or accounting for superior spatial perception abilities, particularly in a three-dimensional setting. Sex differences on the Gerard Rod and Frame Test, but not on the Embedded Figures Test (or Matching Familiar Figures Test) in the present study as well as Roth's (1970), lend support to this interpretation. It therefore seems reasonable to suggest that two- and three-dimensional tasks may not tap the same perceptual variable, at least among preschool children, a hypothesis contradistinctive to Witkin's premise that ability to disembed is tapped by all of his measures, regardless of their dimensionality.

Support for this hypothesis may be extrapolated from research on spatial organization in preschool and third grade children conducted by Keogh (1970a, 1970b) who found boys superior to girls on her tests of Pattern Walking, but not Pattern Drawing. Roth (1970) replicated Keogh's results using the same tasks with 7 year old girls and boys; Roth also reported significant correlations between Pattern Walking and Gerard Rod and Frame Test scores for both sexes, as did Keogh and Donlon (1971) among 8-13 year old learning disabled boys. One may suggest, therefore, that young girls and boys differ in their mode of spatial organization

according to task dimensionality, or that boys are inherently and/or experientially superior to girls in three-dimensional perception. It is also possible that three-dimensional tasks which require active bodily involvement such as the Gerard Rod and Frame Test and Keogh's Pattern Walking Test, provide more or distinctive cues than do two-dimensional ones; boys may be more sensitive to and/or capable of interpreting such cues than are girls.

Identification of the field-independence-dependence continuum by sex across the Gerard Rod and Frame Test, Embedded Figures Test, and Draw-A-Person body articulation analysis yielded somewhat dicouraging results, as few children met field-independence-dependence criteria across all three measures. Further division of subjects into the field-independence-dependence dichotomy across all possible task combinations revealed similar absence of sex differences, and yielded even smaller numbers of subjects. Analyses of conceptual style by sex on the Matching Familiar Figures Test suggested reflectivity-impulsivity is identifiable in preschool children, although no statistically significant sex differences appeared. Although data may be interpreted to suggest that styles of field-independence-dependence and reflectivity-impulsivity are identifiable in preschool children, lack of field-independence-dependence consistency across tasks may be attributable to instrumentation problems and/or subjects' age as discussed previously.

It was also observed by this investigator that few subjects overtly displayed systematic head-eye fixations between the Matching Familiar Figures Test standard and its variants. Subjective observation suggests that those subjects demonstrating systematic scanning behavior made

significantly fewer errors. Aware that most preschool children have not yet begun reading which requires consistent scanning patterns, this investigator found a one-to-one correspondence between superior Matching Familiar Figures Test performance and reading skill upon inquiry of which subjects had begun reading. Support for this observation is lent by Kagan's (1965) report that number of head-eye fixations correlated significantly with Matching Familiar Figures Test response style and reading ability in the first and second grades. Inasmuch as reading requires systematic scanning behavior, it is appealing to speculate that children performing well on the Matching Familiar Figures Test will be better readers than those performing poorly on this test, or that children who have learned to read will perform well on the MFF.

In the present study, verbalization during Gerard Rod and Frame Test administration was not tabulated, an unfortunate circumstance in view of sex differences in performance on this test. However, analyses of verbal responsiveness data on other measures revealed that girls were consistently more verbal than were boys during these tasks, sex differences reaching statistical significance for Matching Familiar Figures Test administration. These results are consistent with observations reported by Keogh (1970b) and Roth (1970), and with data of Kohlberg and Zigler (1967) which suggest that boys are more task oriented and girls more socially and verbally prone. In addition, differences in verbalization were apparent not only by sex, but also in terms of task difficulty; that is, the more difficult a task, the greater the sex differences in verbal responsiveness.

Significant sex differences on verbalization on the Matching Familiar Figures Test only may have resulted not only from its difficulty as indicated by mean scores of both sexes in relation to possible score range, but also from order of administration of tasks. It is possible that since the Embedded Figures Test was given first during one test session, subjects may have been apprehensive and thus less verbal than when in familiar situations. By subsequent Matching Familiar Figures Test administration, subjects may have felt more comfortable with the investigator and the testing situation, thereby behaving in a more usual or typical manner.

Kohlberg and Zigler (1967) reported verbal responsiveness was greater for bright than average children of either sex. Correlations between Draw-A-Person intellectual maturity scores and verbal responses by sex across tasks in the present study were significant for boys, but not for girls. Garai and Scheinfeld (1968) have reviewed considerable literature which provides an explanative basis for boys' greater verbal pattern consistency and lack of significant relationship between IQ and verbal scores for girls. They cite several studies in which teachers were reported to have encouraged and reinforced verbalization from bright boys, but not from girls or children of average ability. In that subjects in the present study attended a preschool providing considerable contact with five or six female teachers, the foregoing research may be interpreted as applicable to these children. That is, their teachers may have elicited and reinforced verbal expressiveness from bright boys, more than from other pupils.

Identification of verbal-independence-dependence by sex across tasks revealed sex differences in the direction hypothesized. As girls consistently made more unsolicited verbal responses than did boys, girls were considered more verbally-dependent and boys more verbally-independent. In Zigler's terms (Yando & Zigler, 1971), these results may be interpreted to suggest that girls are more "outerdirected" than are boys in problem solving style. That is, girls may tend to seek and rely upon external cues, provided by social interaction with the investigator, for enhancing their performance, while boys tend to use their own resources. Observations reported by Keogh (1970b) and Roth (1970) lend support to this interpretation.

Given male task orientation, one might predict negative relationships between verbal responsiveness and field-independence-dependence or reflectivity-impulsivity, although such relationships were not found. Subjects' age and the use of female investigators may have minimized this effect, for Gewirtz and Baer (1958) and Stevenson (1961) demonstrated that use of a female investigator maximized social reinforcement effectiveness with preschool children of both sexes.

Among girls, however, a negative relationship was found between Gerard Rod and Frame Test scores and Draw-A-Person verbal responses. Witkin (1962) reported field-dependent subjects glanced at the investigator's face twice as often as did field-independent subjects; he suggested that individuals with a global field approach were particularly attentive to human faces, a major source of information as to what others might be feeling, thinking, or expecting. In that girls in the present study were more field-dependent and appeared to use

social cues for enhancing task performance, as demonstrated by their verbalization, one might expect a positive, rather than a negative, correlation between girls' Gerard Rod and Frame Test scores and Draw-A-Person verbal responsiveness. Investigator effect may be a source of the negative relationship found, for different investigators interacted with subjects during GRFT and DAP administration. In that no such correlation appeared for boys, and in view of girls' greater sensitivity to social cues, this interpretation merits consideration. An alternative or additional factor may have been the physical format of each task. Inasmuch as sex differences were found on the Gerard Rod and Frame Test, a three-dimensional task, but in none of the two-dimensional tasks in the present study, extraneous cues for enhancing dimensional perception may differ not only by sex, but also for the dimensionality involved.

Methodological Considerations

Scoring patterns reported in this study may have resulted not only from sex differences, but also from characteristics of the instrumentation. Data analyses and subjective evaluations suggested that the Gerard Rod and Frame Test does assess field-independence-dependence among preschool children according to Witkin's criteria. While the apparatus is cumbersome and requires a semi-darkened room for administration, it appeared to capture all subjects' complete attention. Unlike Roth's (1970) observation, girls did not approach the task with timerity, but regarded it a game as did boys. Although the Gerard Rod and Frame Test may be defended only on the basis of face validity, it seems to possess intrinsic interest for young children, and to elicit styles

of field approach, identifiable in Witkin's terms, in this population.

Mean scores for both sexes on Banta's Embedded Figures Test suggest that this version is too simple for normal preschool children. In that the Children's Embedded Figures Test developed for school age children (Karp & Konstadt, 1963) was found too difficult for 7 year olds (Roth, 1970; Watson, 1969), there is need for an age-appropriate Embedded Figures Test for young children. Although Banta's Matching Familiar Figures Test may be defended only on the basis of face validity, scores on this test suggest that it is age-appropriate for preschool children, and that conceptual styles concurring with Kagan's criteria exist in this population. However, the significant relationships between total number correct responses and response latency for boys, but not for girls, merits further investigation in preschool children.

Absence of sex differences on the Draw-A-Person, and lack of correlation between body articulation and other field-independence-dependence measures may be attributed to subjects' age, and thus to unreliability of early IQ scores. A general question, however, must be raised from examination of Witkin's body articulation scoring criteria. This scoring system is so similar to Harris' IQ scaling procedures as to suggest that extensive and independent replication of Witkin's data is needed before it is possible to accept the validity of body articulation scores as substantial indices of field-independence-dependence, but not of general intelligence, at any age.

Data on verbal responsiveness not only confirm observations of Keogh (1970b) and Roth (1970), but also suggest that use of Gewirtz's verbal dependence scale with preschool youngsters of both sexes is

warranted. Investigator observations of subjects' verbalization suggested Gewirtz's response categories adequately covered all forms of responses made during testing. Moreover, scale weightings appeared accurate indices of verbal dependence in that findings of sex differences in relation to response type concurred with Keogh's and Roth's observations.

Sample size may have also confounded results, particularly for sex groups of only 23 subjects each, as correlations and *t* values had to be high before significance levels were reached. Findings just short of statistical significance might have reached significance with a larger population. Further, data are generalizable only to preschool children of similar age, SES, and ethnicity.

Conclusions

It is possible to identify styles of field-independence-dependence, reflectivity-impulsivity, and verbal responsiveness in preschool children. Such measurement, however, involves consideration of sex differences, subjects' age, perceptual variables, instrumentation, and sample size.

During preschool years, sex differences appear to exist on three-dimensional tasks as the Gerard Rod and Frame Test and Keogh's Pattern Walking Test, but not on two-dimensional tasks such as the Embedded Figures Test, the Children's Embedded Figures Test, the Matching Familiar Figures Test, the Articulation-of-Body-Concept analysis of the Draw-A-Person Test, and Keogh's Pattern Drawing Test. These findings may be interpreted to suggest that: (a) two- and three-dimensional tasks do not tap the same perceptual variable; (b) perception of these dimensions develops differentially as a function of age and/or sex;

(c) three-dimensional tasks provide different perceptual cues than do two-dimensional tests; (d) boys are particularly sensitive to and/or capable of interpreting such cues than are girls.

Sex differences in verbal responsiveness among preschool children may be interpreted to suggest that: (a) girls seek and rely upon external cues provided by social interaction with others to enhance their task performance; (b) boys are task oriented, relying upon their own resources rather than those provided by others; (c) extend of outer-directedness as reflected in verbalization, develops differentially as a function of sex, intelligence, age, and task difficulty.

Further research on problem-solving styles in relation to sex, age, and general intelligence is being conducted. The present study is part of a larger investigation designed to determine cognitive and perceptual styles among children entering elementary school.

BIBLIOGRAPHY

Asch, S. & Witkin, H. Studies in space orientation: I. Perception of the upright with displaced visual fields. Journal of Experimental Psychology, 1948, 38, 325-337 (a).

_____ & _____ Studies in space orientation: II. Perception of the upright with displaced visual fields and with body tilted. Journal of Experimental Psychology, 1948, 38, 455-477 (b).

Banta, T., Sciarra, J., Sinclair, D., Jett, J., & Gilbert, M. Cincinnati Autonomy Test Battery. Ohio: University of Cincinnati, 1969.

Bayley, N. & Schaefer, E. Correlations of maternal and child behaviors with the development of mental abilities: Data from the Berkeley Growth Study. Monographs of the Society for Research in Child Development, 1964, 29(6).

Canavan, D. Field dependence in children as a function of grade, sex, and ethnic group membership. Paper read at the APA Convention, Washington, D.C., 1969.

Davis, J. Concept formation as a function of cognitive style, complexity, and training procedure. Technical Report #32. Wisconsin R & D Center, University of Wisconsin, 1967.

Drake, D. Perceptual correlates of impulsive and reflective behavior. Developmental Psychology, 1970, 2, 202-214.

Faterson, H. Articulateness of experience: An extension of the field-dependence-independence concept. In Messick & Ross (Eds.), Measurement in personality and cognition. New York: Wiley & Sons, 1962, 171-181.

Faterson, H. & Witkin, H. Longitudinal study of development of the body concept. Developmental Psychology, 1970, 2(3), 429-438.

Garai, S. & Scheinfeld, A. Sex differences in mental and behavioral traits. Genetic Psychology Monographs, 1968, 77(2), 169-299.

Gerard, H. Factors contributing to adjustment and achievement. Progress Report of a Joint Project of Riverside Unified School District and University of California, Riverside, 1969.

Gewirtz, J. & Baer, D. The effect of brief social deprivation on behaviors for a social reinforcer. Journal of Abnormal and Social Psychology, 1958, 56(1), 49-56.

Goodenough, D. & Eagle, C. A modification of the Embedded-Figures Test for use with young children. Journal of Genetic Psychology, 1963, 103, 67-74.

Green, C. & Zigler, E. Social deprivation and the performance of retarded and normal children on a satiation type task. Child Development, 1962, 33(3), 499-508.

Harris, D. Children's drawings as measures of intellectual maturity. A revision and extension of the Goodenough Draw-A-Man Test. New York: Harcourt, Brace, & World, Inc., 1963.

Hirsch, J. The relationship between two dimensions of cognitive style and locus of control in eight to ten year old boys. Unpublished Masters Thesis, UCLA, 1969.

Kagan, J. Biological aspects of inhibition systems. American Journal of Disabled Children, 1967, 144, 507-512.

_____ Developmental studies in reflection and analysis. In Kidd & Rivoire (Eds.), Perceptual development in children. New York: International University Press, 1966, 487-522.(a)

_____ Reflection-impulsivity and reading ability in primary grade children. Child Development, 1965, 36, 609-628.

_____ Reflection-impulsivity: The generality and dynamics of conceptual tempo. Journal of Abnormal Psychology, 1966, 71, 17-24. (b)

_____ & Kogan, N. Individual variation in cognitive processes. In Mussen (Ed.), Carmichael's handbook of child psychology. New York: John Wiley, 1970, 1273-1365.

_____, Moss, H., & Sigel, I. Psychological significance of styles of conceptualization. Monographs of the Society for Research in Child Development, 1963, 28(2), 73-112.

_____, Pearson, L., & Welch, L. Conceptual impulsivity and inductive reasoning. Child Development, 1966, 37, 583-594. (a)

_____, _____, & _____ The modifiability of an impulsive tempo. Journal of Educational Psychology, 1966, 57(6), 359-365. (b)

_____, Rosman, B., Day, D., Albert, J., & Phillips, W. Information processing in the child: Significance of analytic and reflective attitudes. Psychological Monographs General and Applied, 1964, 78(1), 1-37.

Karp, S. & Konstadt, N. Manual for the Children's Embedded Figures Test. Cognitive Tests, 1963. P. O. Box , Vanderveer Station, Brooklyn 10, New York.

Keogh, B. Pattern copying under three conditions of an expanded spatial field. Developmental Psychology, In press. (a)

_____ Spatial organization of young children. Unpublished Manuscript, UCLA, 1970. (b)

_____ & Donlon, G. Perceptual spatial organization of boys with serious learning disorders. Unpublished Manuscript, UCLA, 1971.

Kohlberg, L. & Zigler, E. The impact of cognitive maturity on the development of sex-role attitudes in the years four to eight. Genetic Psychology Monographs, 1967, 75, 89-169.

Messer, S. Changes in reflection-impulsivity following situationally induced anxiety. Paper presented at the 77th Annual APA Convention, 1969.

_____ Reflection-impulsivity: Stability and school failure. Unpublished manuscript, Rutgers University, 1970.

Oltman, P. A portable rod and frame apparatus. Perceptual and Motor Skills, 1968, 26, 503-506.

Reppucci, N. Parental education, sex differences, and performance on cognitive tasks among two-year-old children. Developmental Psychology, 1971, 4(2), 248-253.

Roth, S. A correlational study of three measures of field-independence-dependence. Unpublished Masters Thesis, UCLA, 1970.

Sontag, L., Baker, C., & Nelson, V. Mental growth and personality development: A longitudinal study. In Mussen, Conger, and Kagan (Eds.), Readings in child development and personality. New York: Harper & Row, 1965.

Stevenson, H. Social reinforcement with children as a function of CA, sex of E, and sex of S. Journal of Abnormal and Social Psychology, 1961, 63, 147-154.

Watson, B. Field dependence and early reading achievement. Unpublished Doctoral Dissertation, UCLA, 1969.

Weiss, A. Untitled. Masters Thesis in progress, UCLA, 1971.

Witkin, H. Psychological differentiation and forms of pathology. Journal of Abnormal Psychology, 1965, 70(5), 317-336. (a)

_____ Some implications of research on cognitive style for problems of education. Archivio di Psicologia, Neurologia, e Psichiatria, 1965, 26, 27-55. (b)

_____ & Asch, S. Studies in space orientation: III. Perception of the upright in absence of a visual field. Journal of Experimental Psychology, 1948, 38, 603-614. (a)

_____ & _____ Studies in space orientation: IV. Further experiments on perception of the upright with displaced visual fields. Journal of Experimental Psychology, 1948, 38, 762-782. (b)

_____, Dyk, R., Faterson, H., Goodenough, D., & Karp, S. Psychological differentiation. New York: John Wiley, 1962.

_____, Goodenough, D., & Karp, S. Stability of cognitive style from childhood to young adulthood. Journal of Personality and Social Psychology, 1967, 7(3), 291-300.

_____, Lewis, H., Hertzman, M., Machover, K., Meissner, P., & Wapner, S. Personality through perception. New York: Harper Bros., 1954.

Yando, R. & Kagan, J. The effect of teacher tempo on the child. Child Development, 1968, 39, 27-34.

_____ & Zigler, E. Outerdirectedness in the problem-solving of institutionalized and noninstitutionalized normal and restarded children. Developmental Psychology, 1971, 4(2), 277-288.

Zigler, E., Butterfield, E., & Capobianco, F. Institutionalization and the effectiveness of social reinforcement: A five- and eight-year follow-up study. Developmental Psychology, 1970, 3(2), 255-263.

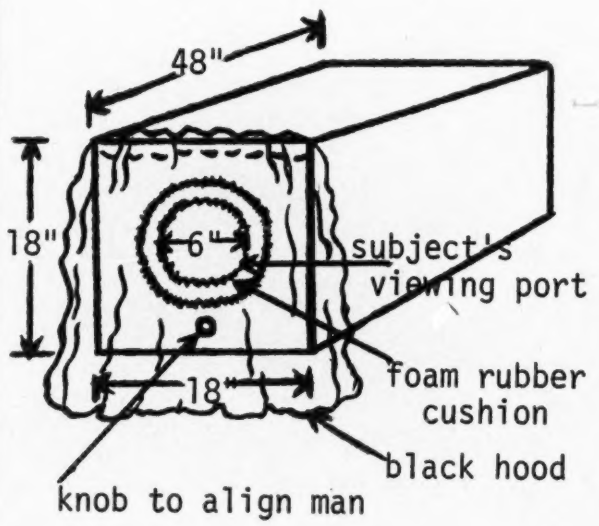
_____, Hodgden, L., & Stevenson, H. The effect of support on the performance of normal and feebleminded children. Journal of Personality, 1958, 26, 106-122.

APPENDIX A

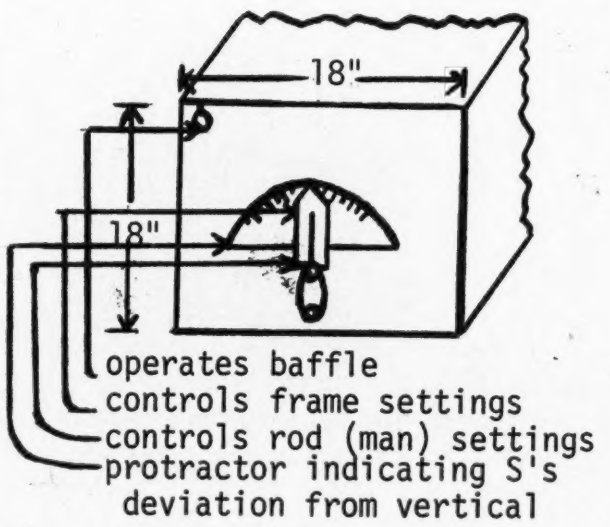
SCHEMATIC REPRESENTATION OF THE

GERARD ROD AND FRAME TEST APPARATUS

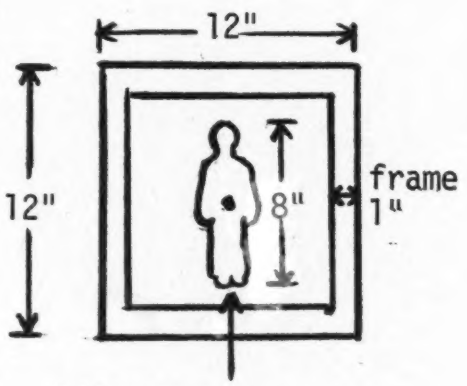
1. Subject's Perspective



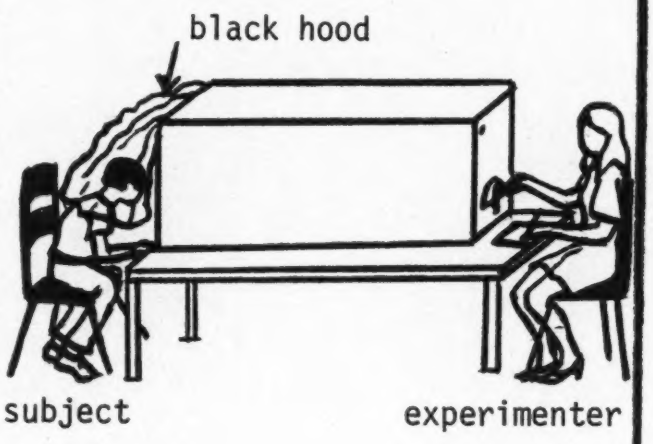
2. Experimenter's Perspective



3. Subject's View of Man and Frame within Apparatus



4. Testing Positions for Subject and Experimenter



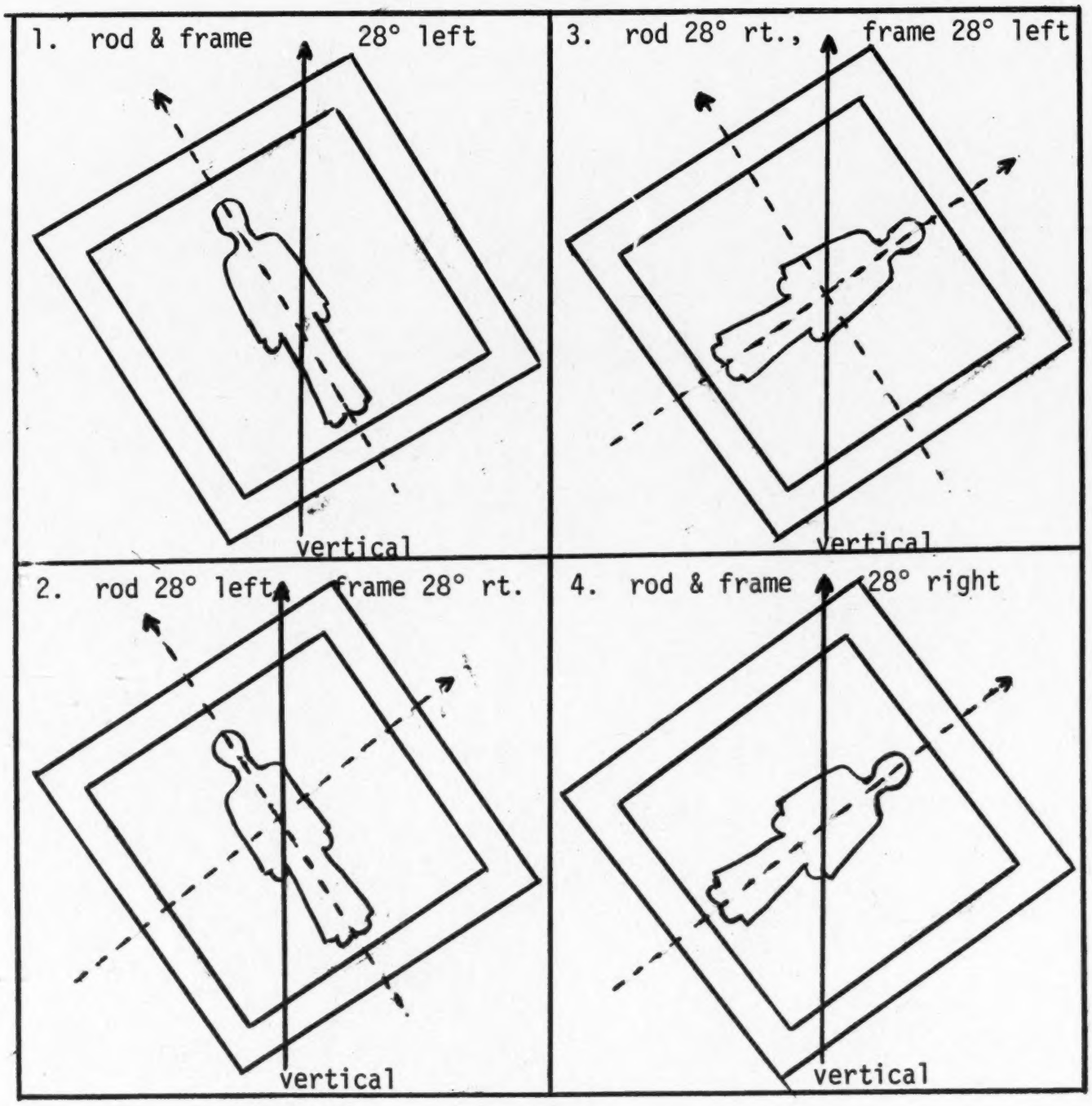
subject sits under black hood with face against viewing port while experimenter controls and records settings

APPENDIX B

SCHEMATIC REPRESENTATION

OF

ROD AND FRAME SETTINGS



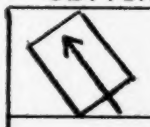
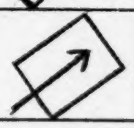
APPENDIX C

GRFT SAMPLE SCORE SHEET

NAME:_____ SCHOOL:_____

DATE:_____ EXPERIMENTER:_____

TIME:_____

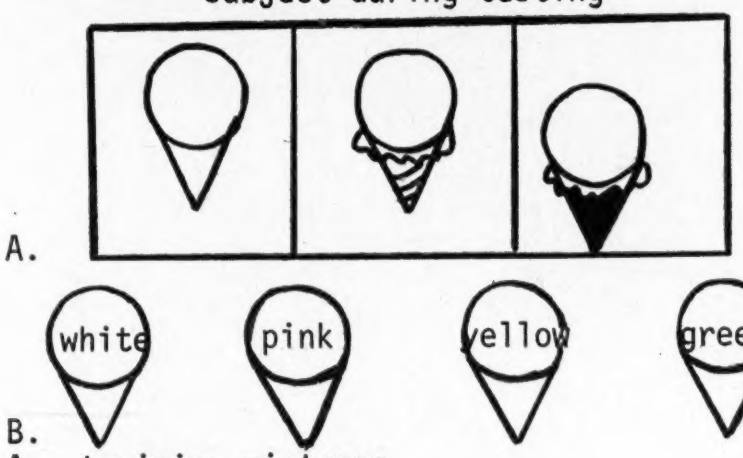
SETTINGS	BLOCK 1	BLOCK 2	BLOCK 3
	T1	T1	T1
	T2	T2	T2
	T3	T3	T3
	T4	T4	T4
TOTALS			
		TOTAL BLOCKS 2 & 3	

APPENDIX D

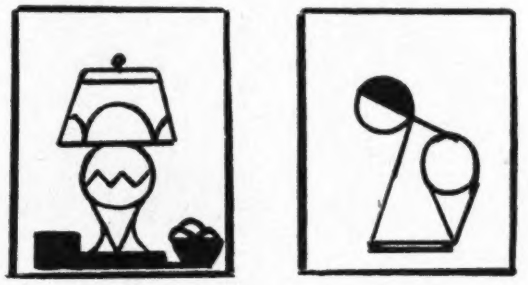
SCHEMATIC REPRESENTATION OF THE

BANTA EMBEDDED FIGURES TEST

subject during testing



A. training pictures
B. cardboard ice cream cones



APPENDIX E

EFT SAMPLE SCORE SHEET

NAME:_____ SCHOOL:_____

DATE:_____ EXPERIMENTER:_____

TIME:_____

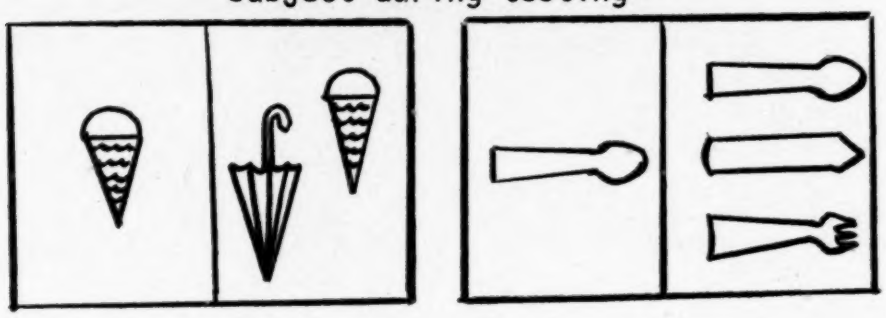
ITEM	NO.RT.	NO.SECS.	SR(4)	TI(3)	DS(2)	ER(1)	TOT.VID.WT.
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
TOTALS							
		TOT.VID.UNWT					

APPENDIX F

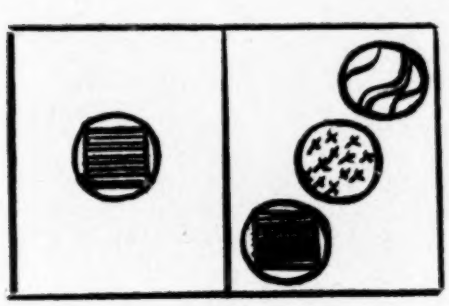
SCHEMATIC REPRESENTATION OF THE

BANTA MATCHING FAMILIAR FIGURES TEST

subject during testing



training sets



non-social
set

social
set

APPENDIX G

MFF SAMPLE SCORE SHEET

NAME:_____ SCHOOL:_____

DATE:_____ EXPERIMENTER:_____

TIME:_____

	ITEM	NO.RT.	NO.SECS.	SR(4)	TI(3)	DS(2)	ER(1)	TOT.VID.WT.
NS	1							
S	2							
NS	3							
S	4							
NS	5							
S	6							
NS	7							
S	8							
NS	9							
S	10							
NS	11							
S	12							
	*TOTALS							
	**		TOT.VID.UNWT					

*TOT. SOCIAL
**TOT. NON-SOCIAL

APPENDIX H

DAP SAMPLE SCORE SHEET

NAME:_____ SCHOOL:_____

DATE:_____ EXPERIMENTER:_____

TIME:_____

VID.	NO.	TOT.WTED.	TOT.UNWT.
SR(4)			
TI(3)			
DS(2)			
ER(1)			
TOTALS			

SEX OF DRAWING:_____

AGE OF CHILD:_____

RAW SCORE:_____

STANDARD SCORE:_____

ABC SCORE:_____